

Exhibit E

IN THE UNITED STATES DISTRICT COURT FOR THE EASTERN
DISTRICT OF NORTH CAROLINA SOUTHER DIVISION

No. 7:23-CV-897

IN RE:

CAMP LEJEUNE WATER LITIGATION,

THIS DOCUMENT RELATES TO:

ALL CASES

DEPOSITION TRANSCRIPT

OF

FRANK J. BOVE, Sc.D

1600 Clifton Road

Atlanta, Georgia 30303

OCTOBER 18, 2024

9:30 A.M.

A P P E A R A N C E S:

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FRANK J. BOVE, Sc.D

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October 18, 2024

(Thereupon, the following proceedings were had.)

(The Continued Deposition from 10/17/2024.).

THE VIDEOGRAPHER: We are now on the record.
Today's date is October 18th, 2024. The time is
approximately 9:53 a.m. This is the continued
deposition of Dr. Frank Bove. Will the court
reporter Jolanda Price now swear in the witness.

FRANK J. BOVE, SC.D, having been first
duly sworn, was examined and testified as follows:

CROSS-EXAMINATION (continued)

BY MR. BAIN:

Q Thank you, Dr. Bove. Again, my name is Adam
Bain, and we're continuing your deposition from yesterday.
And I would like to go back to Exhibit 23 where we left
off yesterday and ask you a few more questions about
Exhibit 23, which is the Morbidity Study of Former
Marines, employees, and Dependents Potentially Exposed to
Contaminated Drinking Water at U.S. Marine Corps Base Camp
Lejeune; correct?

A Yes.

Q Can you turn to page 74 in table six. That

1 table is the odds ratios comparing cancers and other
2 disease among Camp Lejeune Marines with those at Camp
3 Pendleton; correct?

4 A Yes; those who participated in the survey, yeah,
5 uh-huh.

6 Q And there were odd ratios that were below one
7 for comparison of the Camp Lejeune versus Camp Pendleton
8 cohort; right?

9 A Yes, there was a few, yeah.

10 Q And what that would mean is that there were a
11 higher percentage of cases at Camp Pendleton than at Camp
12 Lejeune?

13 A Right.

14 Q For example, scleroderma had an odds ratio of
15 .37; right?

16 A Yes.

17 Q And in the 2017 ATSDR assessment of evidence,
18 there have been a finding that there was equipoise and
19 above evidence of causation for TCE and scleroderma;
20 correct?

21 A Yes.

22 Q But this study showed that in comparing the camp
23 lejeune and camp Pendleton cohorts who had participated in
24 the survey, those at Camp Pendleton were much more likely
25 to get scleroderma than those at Camp Lejeune; right?

1 A Based on the small numbers in the survey, yes.

2 Q And the odds ratios for ALS and aplastic anemia
3 were also below one; right?

4 A Where ALS, aplastic anemia is -- is it on the
5 next page? Yeah; yes, the next page.

6 Q And if there had been selection biases you noted
7 in this particular study, it would have meant that those
8 at Camp Lejeune were more likely to report disease than
9 those at Camp Pendleton; right?

10 A That's possible but not definite. I mean, we do
11 not know which direction the selection bias. We can only
12 hypothesize that what you just said was true.

13 Q Okay. And that was because of the media
14 attention surrounding Camp Lejeune?

15 A The media attention, yes.

16 Q Okay. If you turn to page eight.

17 A Page eight; uh-huh.

18 Q And I'm looking at the very bottom going over to
19 page nine. Do you see where it says, we are not aware of
20 any mechanisms by which exposure to the chemicals in the
21 drinking water at Camp Lejeune could be considered
22 protective for the specific adverse health outcomes
23 evaluated in this study. Odds ratios less than 1.0 may be
24 due to biases including selection and exposure
25 misclassification, as well as random error due to the

1 small numbers for discrete endpoints. Do you see that?

2 A Yes.

3 Q How could odds ratio less than one be due to
4 selection biased if the Camp Lejeune participants are more
5 likely to participate and report diseases?

6 A We don't know that, though. And again, here we
7 were speculating that that's -- that that may have
8 happened. Selection biased can go in either direction.
9 It's differential, meaning, it can go in either direction.

10 Q What selection biased can be hypothesized for
11 Camp Pendleton participants to report more diseases than
12 Camp Lejeune?

13 A It's possible that the people who participated
14 in Pendleton would only participate because they had a
15 disease. Why else would they participate? That could be
16 an argument for why the bias may be towards the null.
17 Again, we don't know what -- why people participated and
18 why -- what, more importantly, why people didn't
19 participate, whether the small participation rate of 20,
20 25 percent roughly.

21 So we can speculate that the bias can go in
22 one direction or another, but that would be speculation
23 unless you had information on why there's people who
24 didn't participate, didn't participate.

25 Q Do you ever try to get information about the

1 influence of selection biased?

2 A Studies try to. And if we had a chance to
3 survey the people who didn't participate and ask them, we
4 would -- for a sample, that might have been possible -- I
5 mean, that would -- might have provided useful information
6 here, but we didn't do that.

7 Q Did you consult with any experts on survey
8 methodology in performing this study?

9 A Yes.

10 Q And who did you consult with?

11 A I can't remember the person's name, but we had a
12 committee, a panel meeting. And at least one person was a
13 survey expert. I cannot remember his name.

14 Q Was that person a federal government employee?

15 A No. No; no. No. All the panel members in any
16 of these panels we have are outside -- usually outside
17 government. They could -- right. They could -- this
18 person was outside government. There are panels where
19 some people still work for other parts of the government,
20 but this person was not -- was an academic.

21 Q Okay. Would that be reflected in some documents
22 that you retained?

23 A I would think that there should be some e-mails
24 because we had to be in contact with each panel member,
25 the time when the meeting was, getting feedback from them,

1 so there should be some documentation somewhere. But I
2 don't think it's mentioned in here. We don't mention
3 those people here.

4 Q You referenced in your testimony yesterday the
5 possibility that the individuals who were assigned to Camp
6 Pendleton may differ from the individuals assigned to Camp
7 Lejeune based on geographical location; do you recall
8 that?

9 A That's -- that was speculation, as well. I
10 mean, I've heard that from some people that those who
11 lived on one side of the divide, continental divide or
12 whatever went to Pendleton and went to Lejeune. I don't
13 think that's the case and I also have seen that there's
14 people going back and forth at least for Marines; not the
15 workers but the Marines.

16 Q Did you do any investigation into that to see
17 whether there's any validity to that?

18 A No, I didn't do anything in particular. There
19 was a variable in the DMDC data where state of birth or
20 something that sort where you could have looked at that,
21 but we weren't -- it wasn't something that we thought was
22 important to do.

23 Q Okay. I want to turn now to the exposure
24 response analyses that you did in this particular study.

25 A Okay.

1 Q And I want to focus on table seven and eight
2 which are the tables showing the exposure response
3 analysis for TCE and PCE separately, a low, medium and
4 high exposures. So those start at page 76?

5 A Yes.

6 Q So in this particular report you are reporting
7 all of the relationships that you did for the different
8 diseases and the different levels of TCE and PCE exposure;
9 correct?

10 A Right.

11 Q So you didn't select out just the ones that
12 showed monotonic relationship. You list all the
13 relationships here; correct?

14 A Yes.

15 Q The 2017 assessment of evidence listed the
16 relationship between TCE and all types of Leukemia as
17 being equipoise and above; right?

18 A Yes.

19 Q The analysis of the exposure response
20 relationship for Leukemia and table seven actually shows a
21 reverse exposure response relationship with fewer
22 percentages of Leukemias in the medium and higher exposure
23 groups; right?

24 A Yes.

25 Q And if you look at Parkinson's disease in table

1 seven, that does not show a monotonic dose response
2 relationship, does it?

3 A No.

4 Q The 2017 assessment of evidence listed the
5 relationship between TCE and Non-Hodgkin lymphoma as
6 sufficient and PCE and Non-Hodgkin lymphoma as equipoise
7 and above; correct?

8 A Yes.

9 Q For lymphomas in table seven, the exposure
10 response relationship for TCE does not show a monotonic
11 exposure response relationship, does it?

12 A No.

13 Q And the same is true for PCE in table eight?

14 A Yes.

15 Q Okay. I'm done with this particular document
16 now. If you can take out table or exhibit six from your
17 stack there if you find it.

18 A Which one is it?

19 Q It's the updated mortality study?

20 A Yes, okay. That's what I thought it was, yeah.

21 Q So we're going to focus now on exhibit six,
22 which is the Evaluation of Mortality Among Marines, Navy
23 personnel and Civilian workers exposed to contaminated
24 drinking water at USMC base Camp Lejeune, a cohort study,
25 2024; correct?

1 A Yes.

2 Q Okay. This study was originally made public on
3 a preprint server; is that right?

4 A Yes.

5 Q And at that time the version had not undergone
6 external peer review; right? When it was put on the
7 preprint server?

8 A No, it went through ATSDR's process which
9 includes external peer review.

10 Q Okay. But the journal itself is not peer
11 reviewed?

12 A No, preprint data, they don't -- they don't, no.

13 Q Okay. So it had gone through the full ATSDR
14 peer review process?

15 A Oh, yes.

16 Q But it had not gone through the journal's peer
17 review process?

18 A Right; right.

19 Q And the only other study that was made public in
20 preprint format that you worked on with respect to Camp
21 Lejeune was the 2024 Cancer Incidence Study; right?

22 A Right. And the same thing, it was peer reviewed
23 internally using the ATSDR peer review process, but not
24 peer reviewed -- the journal. But this actual is peer
25 reviewed by the journal, this document.

1 Q Yes.

2 A Yes, okay. Okay. Okay; yes.

3 Q It did become peer reviewed and published
4 eventually.

5 A Yeah; yeah.

6 Q But I want to ask about putting a study out in
7 the public in preprint format before there is journal peer
8 review. Is that an unusual practice for ATSDR?

9 A It's not unusual -- it is unusual for ATSDR; not
10 unusual for CDC and not unusual in general. They're
11 encouraging the Journal -- at least environmental health,
12 Environmental Health Perspectives. I'm sure other
13 journals are all doing that. So to me it was new I would
14 have to admit. And I don't think ATSDR -- the only
15 studies really the ATSDR epi-studies are coming were camp
16 Lejeune and a few others, and those haven't actually been
17 published yet. So we haven't had the opportunity probably
18 before recently to do this. And I think this is a recent
19 development among journalists.

20 Q What is the reason for putting an article like
21 out -- like this out there in the public before the
22 journal has done peer review? Is there any particular
23 reason for that?

24 A I mean, the journals must have some reason. I
25 don't know what their reason is. Our reason was to get

1 the information out as quickly as possible. These studies
2 took a long time. There was a lot of interest out there,
3 both in the Cap but also in the general public and the
4 media wanting to know the findings. So that's the reason.

5 Again, it's -- I agree that it's important
6 to have it published in a journal, and that's why we did
7 send it to a journal and worked with their peer review
8 processes.

9 Q Okay. Thanks for that clarification. So in
10 this particular article you're listed as the author along
11 with April Greek, Ruth Gatiba, Rona Boehm and Marcie
12 Mohnsen; is that correct?

13 A Yeah, I think that's how you pronounce it, yeah.

14 Q And these other authors aside from yourself,
15 they weren't included on the preprint version of the
16 study; right?

17 A That's correct.

18 Q And why was that?

19 A The journal itself said why don't you have other
20 authors on here. And so I said, okay; these people all
21 were crucial in the data collection. And so normally if
22 you just do data collection, you might not qualify to be
23 an author.

24 Q Uh-huh.

25 A Coauthor. But I thought that they did -- I

1 wouldn't have had the data without their involvement, so I
2 listed them. Probably in the preprint they're
3 acknowledged. But there wasn't -- their involvement was
4 over once the data was collected.

5 Q So other than the data collection, they did not
6 have other involvement?

7 A Right.

8 Q And so you were, in essence, the person what
9 analyzed the data and wrote this up.

10 A Yes.

11 Q This was a retrospective cohort study; is that
12 right?

13 A Yes.

14 Q Was this considered an update of the earlier
15 mortality study that you had done in 2014?

16 A Yes.

17 Q What is the difference between the two studies?

18 A One big difference is that the expanded the
19 subgroup that we focused on to include those who started
20 active duty January of '75 or -- between January and March
21 of '75 and probably included some in December of '74 to
22 expand the subgroup larger so that we would have a little
23 bit more statistical power, so that's one difference.

24 The other major difference is that it
25 extends follow-up to 2018. And this is a young cohort.

1 Anytime you can expand the period that you're following
2 up, it's helpful to have -- to do that to have more cases
3 of particular causes.

4 Q Yeah, I did see there that it seemed like the
5 numbers got better or larger for the cohorts.

6 A Yes.

7 Q And you just said that you expanded it. How
8 were you able to do that and why didn't you do that in the
9 first study?

10 A Well, the unit code was only available in the
11 DMDC starting the second quarter of '75. However, I
12 thought that in order to -- I thought it was important to
13 expand the cohort and I thought that we could assume that
14 those in the first quarter, who started active duty in the
15 first quarter of '75, where they were in the second
16 quarter was probably indicative of where they were in the
17 first quarter. And so I thought that that wouldn't make
18 much difference to include those people as well. So that
19 was the purpose there.

20 Other differences were that we looked the
21 cohort data to make sure that it was correct, and there
22 were some discrepancies from the previous study that I had
23 to correct.

24 Q What type of discrepancies?

25 A Assigning some people to Camp Lejeune, I pretty

1 much from -- that probably should have been kept at Camp
2 Pendleton. The problem was -- and I'll explain -- try to
3 explain it. Initially for the earlier study we included
4 people from who started active duty or who were in the
5 DMDC only in '86 or '87. They weren't before that.

6 Q Uh-huh.

7 A So we wanted to look at of all that period.
8 Then we decided that the contamination was pretty much
9 over by the end of '85, if not earlier, and so why include
10 '86 and '87. But if someone was at Camp Pendleton between
11 the period of '75 and '85 and not at Camp Lejeune during
12 that period but was at Camp Lejeune in '86 or '87, they
13 were designated as Camp Lejeune and they really should
14 have been designated as Camp Pendleton, so there's some
15 misclassification that I wanted to clean up, and that's
16 why there are some differences here.

17 There's also a typo. I thought I want to
18 point that out that I found while looking over this the
19 other day, and unfortunately I didn't catch it before it
20 was published. But in the text -- so you can correct
21 this -- on page three, the second -- the bottom of the
22 second paragraph, those numbers, 154,821, 163,484, were
23 actually for the Cancer Incidence Study, so this is a cut
24 and paste --

25 Q Okay; okay.

1 A -- error.

2 Q Thanks for correcting that.

3 A The abstracts right; the tables are right. It's
4 just that one spot.

5 Q So if someone were to compare the datasets from
6 the 2014 and the 2024 studies, they would be able to
7 figure out, you know, which ones you may have put into the
8 different cohorts, what people were added, et cetera?

9 A I think so, yes. If you have all the -- if you
10 have the data, yeah.

11 Q Okay. For this particular study for the
12 mortality information, you obtained that from the Social
13 Security Administration and the National Death Index?

14 A The vital status, whether they're alive or dead,
15 was through tracing and the Social Security databases.
16 The causes of death -- and also the NDI. And the causes
17 of death were from the NDI.

18 Q And the difference from the earlier study was
19 that the death data was analyzed through the end of 2008?

20 A Yes.

21 Q And this study, the data was analyzed through
22 2018?

23 A Yes. You also, in the previous study we did not
24 use a tracing locator firm to determine vital status. We
25 just used the Social Security. It was much better this

1 time. We were able to identify some people we thought
2 were dead that weren't and vice versa. And --

3 Q And we discussed a little bit yesterday, but in
4 contrast to the 2014 study and this study there was no
5 individualized exposure assessment done; correct?

6 A No; no. No.

7 Q And was there any discussion in ATSDR whether or
8 not to use the ATSDR's water model to do an individualized
9 exposure assessment in 2024?

10 A No discussion within ATSDR. I made that
11 decision.

12 Q And can you again just summarize your reason for
13 that decision?

14 A The reason was that we were -- the water
15 modeling and any exposure assessment based on the water
16 modeling would be for residential exposures. And there
17 are people who resided outside of the base or even in
18 places where the drinking water wasn't contaminate but
19 probably got exposure during training or other activities
20 on base.

21 So using -- just focusing on residential
22 exposure you would miss -- you would identify people as
23 unexposed when they were likely exposed. And so you
24 really are introducing a lot of exposure
25 misclassification. The dose response curves would be

1 affected.

2 So I thought that this time around just
3 because we can -- because most of the people at Camp
4 Lejeune had some exposure if not all. It would just be
5 better to do a straight up comparison, and the same with
6 the civilian workers.

7 Q It's true that you have the data available to do
8 the same type of exposure response analysis that you had
9 done in 2014?

10 A Yes.

11 Q And you mentioned the fact that there would have
12 been exposure outside of residency such as during
13 training. That is the reason that you didn't do that type
14 of analysis here. And what is the basis for your
15 understanding that there would have been significant
16 exposure during training?

17 A From discussing it with Cap members, with
18 discussing it with retired -- other retired Marines and
19 with discussing it with the Marine Corps itself.

20 Q Okay. So would it have been discussions you had
21 with Cap members, retired Marines and people who are
22 currently in the Marine Corps?

23 A Or worked at Camp Lejeune, yes.

24 Q Okay. Are there any individuals in particular
25 who gave you information regarding this that you can

1 recall?

2 A Well, I can't -- I don't know for sure, but I've
3 had so many conversations with Scott Williams over the
4 years. We probably discussed this.

5 Q Okay. And Jerry Ensminger as well?

6 A Jerry -- well, the Cap in general. Well, not
7 just Jerry Ensminger.

8 Q Were there other Marines on the Cap besides
9 Jerry Ensminger?

10 A Yes.

11 Q Who else do you recall?

12 A I see his face --

13 Q Tom Townsend, was he on the Cap at one point?

14 A Tom Townsend was on the Cap.

15 Q He's a former Marine?

16 A He's a former Marine.

17 Q At Camp Lejeune?

18 A Yes. There was someone who came from Detroit,
19 drove all the way down for the meetings. He was a Marine.
20 I can't remember. I'm having trouble remembering their
21 names. If I saw a list of Cap members, I could point them
22 out to you.

23 Q But there were a number of Marines on the Cap
24 who have talked to you about getting water during
25 training?

1 A Yes.

2 Q And from Hadnot Point?

3 A Yes -- well, they said they were training and
4 they were served water buffaloes. Then I would ask --
5 probably asked Scott Williams where the water might have
6 been if they were training in mainside. And so I think
7 that that's where I got that information.

8 Q You did do an exposure analysis in this report
9 that you characterize as a secondary analysis; right?

10 A I'm trying to remember.

11 Q Looking at the duration of --

12 A Oh, right. I'm sorry. Yes; yes.

13 Q So you looked at the duration of an individual's
14 being stationed or employed at camp Lejeune as a proxy for
15 exposure?

16 A For -- yeah. Yes. And again, that also has its
17 limitations because just -- just because you were there
18 longer, you may not have been exposed. If you were there
19 shorter, you may have been there, you know, exposed
20 heavily. The same problem.

21 Q So there was no distinguishing in the analysis
22 where the person lived or worked on base?

23 A No, not for duration.

24 Q So a person who lived, for example, at Camp
25 Geiger for three months would be treated the same as a

1 person who lived at Tarawa Terrace for three months?

2 A Only if they're Eighth Marines. No one else
3 from Geiger was included in this study.

4 Q So if they --

5 A Or New River.

6 Q But if they were Marines at Geiger or New River,
7 they would be treated the same as a Marine who resided at
8 Tarawa Terrace?

9 A Again, there was no -- unless they were also --
10 their unit code also was at Camp Lejeune proper. In other
11 words, New River was separate.

12 Q Okay.

13 A Always separate, because they have a different
14 situation, contamination situation. And Geiger was never
15 included except for the Eighth Marines; okay? So if
16 you're talking about -- yes, some people could have been a
17 Tarawa Terrace and some people could have been in Watkins
18 Village. And if the same duration, they would be put in
19 the same box for a duration.

20 Q And the same for people who might have been at
21 Camp Johnson?

22 A Camp Johnson as well, yes. Uh-huh.

23 Q Okay. If you look at page five and if you look
24 at the last full paragraph and you report on some
25 monotonic trends in the exposure response analysis. And

1 you report that monotonic trends were seen for
2 myelodysplastic syndrome?

3 A Okay. Where are we here?

4 Q At the bottom of the page, the last full
5 paragraph right there (indicating).

6 A Oh, here (indicating). Okay. Okay.

7 Q So in this article the only results that you
8 report for the exposure response analysis are for the
9 monotonic trends that were observed for myelodysplastic
10 syndrome?

11 A Myelodysplastic syndrome.

12 Q Yes. Thanks for that correction -- in the
13 Marine/Navy cohort and kidney cancer and the civilian
14 worker cohort; correct?

15 A No. I reported all the findings.

16 Q Okay. But as far as in the text of the report.

17 A Oh, in the text, yes.

18 Q The findings themselves are included in the
19 tables; right?

20 A Yes.

21 Q And those are in the supplemental materials?

22 A Yes. I think that's where they are. Let me
23 just double-check that.

24 Q Okay.

25 A Yeah. There were too many tables to include in

1 the main text, so they ended up in the supplemental.

2 MR. BAIN: So what's the next exhibit number?

3 Can I have this marked as 24?

4 (Exhibit Number 24 was marked for Identification.).

5 Q (By Mr. Bain) So Dr. Bove, I'm showing you
6 what's been marked as Exhibit 24. And this is the
7 full table of the analyses for the exposure
8 response.

9 A Yes.

10 Q That you did?

11 A Yes.

12 Q That's Exhibits S6 through S8 of the
13 supplemental materials or tables -- I'm sorry, Table S6
14 through Table S8 of the supplemental materials?

15 A I'm just trying to see -- I'm looking at S7
16 trying to -- it doesn't look like S7 is -- I'm trying to
17 understand why -- let me take a second and take a look at
18 this for a minute.

19 Q I think just table S6 and table S8 are the
20 exposure response analyses; is that right?

21 A Yes, I'm trying to think -- oh, contributing
22 cause of death. That's the difference, okay. Right. S6
23 and S8 are the -- looking at duration, yes.

24 Q And S6 is the Marine/Navy group and S8 is the
25 civilian group; right?

1 A Yes.

2 Q And if you look at table S6, with respect to
3 kidney cancer.

4 A Okay.

5 Q It's at the bottom of the first page.

6 A Yes.

7 Q It actually shows an inverse exposure response
8 relationship; correct?

9 A Yes.

10 Q What do the odds ratios -- oh, excuse me.

11 A Hazard ratios.

12 Q Hazard ratios.

13 A Yes.

14 Q Hazard ratios. What's the distinction between
15 the Odds ration and hazards ratio?

16 A Well, in logistic regression provides you with
17 odds ratios. The Cox Model is a survival method and
18 provides hazard ratios, which is similar to risk ratios,
19 incidents risk ratios, yes.

20 Q Okay. And the confidence intervals show the
21 level of precision; right?

22 A Yes.

23 Q And here for kidney cancers the confidence
24 intervals are right around -- the ratios of the confidence
25 intervals are right around two; correct?

1 A Yes.

2 Q On the next page for the Navy and Marine cohort
3 Non-Hodgkin lymphoma, do you see it at about five down
4 from the top?

5 A Yes.

6 Q And that also shows an inverse exposure response
7 relationship; correct?

8 A Yes.

9 Q So that the odds ratio for the higher --

10 A Hazard ratios.

11 Q Excuse me. Thank you.

12 A Sorry.

13 Q The hazard ratios for the higher -- are higher
14 for the low duration than the medium duration; right?

15 A Yes.

16 Q Okay.

17 A Yes.

18 Q And the confidence interval ratios are right
19 around two for these relationships; right?

20 A Yes.

21 Q Now let's look at the civilian cohort page --
22 table S8?

23 A Uh-huh.

24 Q And take a look at urinary bladder on the first
25 page, about two-thirds the way down. Do you see that?

1 A Yes.

2 Q The civilian cohort for urinary bladder cancer
3 shows an inverse exposure response relationship; right?

4 A Yes.

5 Q So the hazard ratios are higher for the low
6 duration than for medium duration. And the hazard ratio
7 is higher at the medium duration than at the high
8 duration; right?

9 A Yes.

10 Q Okay. Let's turn back to the article itself
11 which is exhibit six.

12 A Uh-huh.

13 Q I want to ask you some questions about the
14 standard mortality ratio. So take a look at table two on
15 page six.

16 A Yes.

17 Q This table includes the standard mortality
18 ratios for the Marine/Navy cohort; right?

19 A Yes.

20 Q And the ratios compare the Camp Lejeune and Camp
21 Pendleton Marine/Navy cohort to the general population;
22 right?

23 A Yes.

24 Q The ratios have been adjusted for the sex, race
25 and age; correct?

1 A Yes; and calendar period.

2 Q What was the other one?

3 A Calendar period.

4 Q Can you explain what that is?

5 A Just the year -- or the calendar period,
6 meaning, the five-year range where the disease happened.

7 Q Okay. For the Camp Lejeune cohort, the standard
8 mortality ratio for all cancers is .92; right?

9 A Oh, yes.

10 Q And that means after adjustments for sex, race
11 and age, there are eight percent fewer deaths from cancer
12 in the Camp Lejeune cohort than in the general population.

13 A Yes.

14 Q Is that right?

15 A Yes.

16 Q If you look at Non-Hodgkin lymphoma; do you see
17 that? NHL?

18 A Yes.

19 Q The standard mortality ratio for the Camp
20 Lejeune cohort is .73; right?

21 A Yes.

22 Q That means after adjustments for sex, race and
23 age, there are 27 percent fewer deaths from NHL in the
24 Camp Lejeune cohort than in the general population; right?

25 A Yes.

1 Q Take a look at Leukemias, which is two down from
2 there.

3 A Uh-huh.

4 Q The standard mortality ratio for the Camp
5 Lejeune cohort is .87; correct?

6 A Yes.

7 Q And that means after adjustments for sex, race
8 and age, there are 13 percent fewer deaths for Leukemia in
9 the Camp Lejeune cohort than in the general population;
10 right?

11 A Yes.

12 Q Okay. If you can turn to table three which is
13 the next page, this includes the standard mortality ratios
14 for the civilian worker cohort; correct?

15 A Yes.

16 Q And these ratios also have been adjusted for
17 sex, age, race and calendar period?

18 A Yes.

19 Q For the Camp Lejeune civilian worker cohort, the
20 standard mortality ratios for all cancers is .93; right?

21 A Yes.

22 Q And that means that after adjustments for sex,
23 race, age, calendar period, there are seven percent fewer
24 deaths from cancer in the Camp Lejeune civilian cohort
25 than in the general population; right?

1 A Yes.

2 Q If you look at urinary bladder cancer, which is
3 about a third of the way down. Do you see that?

4 A I'm getting there, yes.

5 Q For urinary bladder, the standard mortality
6 ratio for the Camp Lejeune cohort is .85; correct?

7 A Yes.

8 Q And that means after adjustments for sex, race,
9 age and calendar period, there are 15 percent fewer deaths
10 from urinary bladder cancer in the Camp Lejeune cohort
11 than in the general population; right?

12 A Yes.

13 Q Okay. Now, I want to ask you some questions
14 about the comparison between the camp Lejeune and the camp
15 Pendleton cohorts. You state in a study that you focused
16 on causes of death with an adjusted hazard ratio of
17 greater than or equal to 1.2 --

18 A Uh-huh.

19 Q -- in confidence interval ratios of less than
20 three; right?

21 A Right. I highlighted those.

22 Q Okay; you highlighted those. In the assessment
23 of evidence you had written that the effect estimate was
24 considered to have good precision or less uncertainty if
25 the confidence interval ratio was less than or equal to

1 two. Do you recall that?

2 A Yes; yes.

3 Q Given that you had looked at that confidence
4 interval for the assessment of evidence, why did you use a
5 higher confidence interval ratio of less than or equal to
6 three for considering the results of this study?

7 A Well, again, we're highlighting findings in this
8 study. The assessment was more -- is looking at a whole
9 range of studies. And so I felt that to be a little bit
10 more strict with the precision there. To -- so I thought
11 here it would be better to because we're -- it's one study
12 with small numbers of cases of particular causes of death;
13 some there were large numbers but some were small numbers,
14 limited to -- less than or equal to three I thought for a
15 confidence interval ratio was reasonable.

16 Q In changing the benchmark that you used from two
17 to three, what affect would that happen?

18 A It just means I would highlight probably fewer
19 diseases because they -- you know, highlighted those that
20 had at least a confidence inter-ratio of three. And so if
21 I narrowed it, the confidence interval to two, the ratio
22 to two, that would mean fewer highlighted in the text.
23 But again, all the findings are there. If someone wanted
24 to use a different confidence interval ratio or ignored it
25 altogether, they had the information in front of them.

1 Q Okay. In the abstract for the Marine/Navy
2 cohort, you identified three types of cancer deaths that
3 met the criteria of hazard ratio -- 1.2 --

4 A Right.

5 Q In confidence interval ratio of less than three,
6 and that would be kidney cancer, esophageal cancer and
7 female breast cancer; right?

8 A Yes.

9 Q And for both esophageal cancer and female breast
10 cancer, the ATSDR's assessment of evidence classify the
11 relationship between chemicals in the Camp Lejeune water
12 in those cancers is below equipoise evidence of causation;
13 right?

14 A Yes, based on what we knew up until the middle
15 of 2016. There has been, again, more recent articles and
16 they're discussed in the text.

17 Q For the personnel cohort, the civilian personnel
18 cohort, you identify two types of causes of death that met
19 the criteria which were chronic kidney disease and
20 Parkinson's disease; right?

21 A Let's see. Let me read this closely. These
22 actually were confident interval ratios greater than three
23 for workers -- where are we looking at -- or less than
24 three for kidney disease and Parkinson's, I'm sorry,
25 right.

1 Q So those are the two that met --

2 A Yeah.

3 Q -- the criteria of hazard ratio of greater than
4 or equal --

5 A Yes.

6 Q -- to --

7 A Yes.

8 Q -- 1.2 --

9 A Yes.

10 Q -- confidence interval ratio of less than or
11 equal to the three?

12 A Yes.

13 Q And for both of those disease with the
14 confidence interval ratio was between two and three;
15 right?

16 A Yes.

17 Q So they wouldn't have met the criteria that you
18 used in the assessment of evidence if the benchmark had
19 been less than or equal to two for a confidence interval
20 ratio?

21 A It wouldn't have been highlighted.

22 Q Okay.

23 A Although, I did highlight others in the abstract
24 that had confidence interval ratios greater than three.
25 And again, I think the point here is that with the

1 workers, it's a smaller -- a much, much, much smaller
2 cohort.

3 Q Uh-huh.

4 A And so the confidence intervals in general are
5 going to be wide unless there's a lot of cases of a
6 particular cause of death.

7 Q And the ones where the confidence interval ratio
8 were greater than three that you highlighted were
9 testicular cancer, cervical cancer and ovarian cancer;
10 right?

11 A Yes, I think that's all of them.

12 Q Were those the only diseases that had an
13 adjusted hazard ratio of greater than 1.2?

14 A And had a confidence interval ratio of greater
15 than three?

16 Q Yeah; or did you use some other criteria to
17 highlight those particular diseases?

18 A No, no. I think that probably is the case.
19 There's -- so cause of death with hazard ratios greater
20 and equal to 1.2 and confidence interval ratios greater
21 than three with Parkinson's myelodysplastic syndrome and
22 testi-cervic and ovary; okay?

23 Q Uh-huh.

24 A And that's what the -- yeah.

25 Q Okay. And none of those cancers that are

1 highlighted there testicular cancer, cervical cancer,
2 ovarian cancer, have been identified in the literature as
3 related to the chemicals in the Camp Lejeune water; is
4 that correct?

5 A No. Cervical cancer, we didn't have a chance to
6 evaluate that in the assessment. In fact, the last
7 sentence on the first page of the assessment says that;
8 that we wanted to look at lung and cervical cancer but we
9 didn't have enough time to go -- to prepare them and then
10 peer review, and we felt that we had to get the document
11 out.

12 But the -- in the text itself, and I'm
13 pretty sure we discussed some of the more recent data for
14 cervical, as well as the past ones that we would have
15 included in the assessment if we had looked at it.

16 Q And those were other studies outside the context
17 of Camp Lejeune?

18 A Yes. You know, these were occupational studies.

19 Q Okay. In the Marine/Navy cohort, there were
20 causes of death where the adjusted hazard ratio and
21 comparing camp Lejeune and Camp Pendleton was below .80;
22 is that true?

23 A I'm sure there were some.

24 Q If you look at table two.

25 A Oh, we're back to table two. You mean the SMR's

1 were less than point eight; is that what you're saying?
2 Or the risk ratio?

3 Q Yeah, the third column is a comparison of the
4 risk ratio between Camp Lejeune and Camp Pendleton; right?

5 A Right; these are poisson regression comparison
6 of Camp Lejeune and Camp Pendleton, using the data that
7 went into the SMR's, yeah.

8 Q And there were some where that comparison showed
9 the adjusted hazard ratio for Camp Lejeune versus Camp
10 Pendleton was less than .80; right?

11 A I'm sure there's some. Let me just look through
12 the line here.

13 Q For example, male breast cancer and thyroid are
14 two that --

15 A Right. Thyroid, male breast cancer is -- Oh,
16 yeah up here (indicating). Yep.

17 Q So male breast cancer is .39 and thyroid is .72;
18 correct?

19 A Yes.

20 Q Okay. Let's discuss the potential for
21 confounding by factors for which you didn't have direct
22 data. I know that we talked a little bit about that
23 yesterday.

24 A Uh-huh.

25 Q You didn't have direct data with respect to

1 smoking, alcohol consumption or occupational history
2 before or after active duty for these cohorts; right?

3 A Yes, that's right.

4 Q That's correct?

5 A Yes, that's correct.

6 Q And for the smoking-related diseases you used
7 for this analysis, Chronic Obstructive Pulmonary Disease,
8 COPD, and cardiac vascular disease mortality; correct?

9 A Yes; COPD mortality and cardiovascular disease
10 mortality.

11 Q Okay. So mortality for each of those?

12 A Yes.

13 Q And there are other diseases that are known to
14 be caused by smoking; right?

15 A Yes.

16 Q For example, you used stomach cancer to account
17 for smoking, confounded in the 2014 studies; right?

18 A Well, I also used stomach cancer, I think, for
19 alcohol consumption, but, yes.

20 Q Okay.

21 A Stomach cancer is very weakly associated with
22 smoked. Really COPD and cardiovascular disease would be a
23 stronger associate; but, yes, in the previous study.

24 Q Did you use COPD in the 2014 study? I can't
25 recall.

1 A I think so.

2 Q Okay.

3 A I have to go back and look, but I probably did.

4 Q But you decided not to use stomach cancer in
5 2014 because of the weak relationship?

6 A I was criticized by some reviewers that stomach
7 cancer really wasn't that strongly associated with
8 smoking. I'm trying to think if did I use it for alcohol
9 or not. I think I didn't use it for alcohol, that's
10 right.

11 Q What did you use for alcohol?

12 A For alcohol I used mortality due to alcoholism,
13 mortality due to chronic liver disease, I think it was.
14 And that third one was alcohol-related liver disease
15 mortality. And again, they're all mortality --

16 Q Uh-huh.

17 A -- diseases.

18 Q Okay. So using the hazard ratio of 1.08 for
19 COPD, you determined that the prevalence difference in
20 smoking between Camp Lejeune and Camp Pendleton is
21 six percent; right?

22 A Yes.

23 Q And that meant that there was a six percent
24 greater rate of smoking in Camp Lejeune in comparison of
25 Camp Pendleton, using that as a benchmark?

1 A Yes.

2 Q And using that to make adjustments for smoking
3 between Camp Lejeune and Camp Pendleton would reduce the
4 hazard ratios by about 3.3 percent for kidney cancer and
5 7.3 percent for esophageal cancer as you report on page
6 five.

7 A Page five, okay. Let me take a look. Let me
8 just double-check that.

9 Q Okay. It's the very bottom --

10 A Yes.

11 Q -- of page five and I think it goes over to the
12 top --

13 A Yeah.

14 Q So is that correct?

15 A Assuming it's by less than 3.3 percent, kidney
16 esophagus and lung; is that --

17 Q Esophageal.

18 A Yeah.

19 Q Seven point three; less than or equal to 7.3; is
20 that right?

21 A Okay. Slow down.

22 Q Okay.

23 A Let me think for a minute.

24 Q Yeah; no, take your time.

25 A Assuming it's six percent prevalence difference,

1 the hazard ratios for cancers of the kidney, esophagus and
 2 lung would decrease by less than or equal to 3.3
 3 percent -- oh, okay. Yes; less than or equal to 7.3
 4 percent and less than or equal to 9.3 percent
 5 respectively, yes. Yes.

6 Q So for kidney cancer it would reduce by --

7 A Three point --

8 Q -- approximately 3.3 percent.

9 A Right.

10 Q For esophageal cancer, approximately 7.3
 11 percent; right?

12 A Yes.

13 Q And the hazard ratio for Parkinson's disease I
 14 think you mentioned yesterday would actually increase by
 15 6.8 percent; right?

16 A Yes. Yes.

17 Q And these adjustments are not reflected in table
 18 two; correct?

19 A No.

20 Q Okay.

21 A No. These are straight -- I mean -- oh,
 22 straight. These are not adjusted for smoking or alcohol.
 23 This was part of a supplement, Quantitative Bias
 24 Analysis --

25 Q Right.

1 A -- to get a handle on what would happen if there
2 was a six percent difference in this case and how would
3 that affect the hazard ratios.

4 Q And --

5 A So, no, it wouldn't have been in table two
6 anyway because those are SMR's. If any changes, they
7 would have been in the other tables, but, no.

8 Q Okay.

9 A Yeah.

10 Q They're reflected in the supplemental materials?

11 A Yes.

12 Q And you actually refer to tables S10 through S12
13 here?

14 A Yes.

15 Q And so I'm going to show you those supplemental
16 materials and mark that as the next exhibit.

17 (Exhibit Number 25 was marked for Identification.).

18 Q (By Mr. Bain) Dr. Bove, I'll show you what
19 has been marked as Exhibit 25.

20 A Uh-huh.

21 Q And these are tables S10 and S11 --

22 A Uh-huh.

23 Q -- from your supplemental materials; is that
24 right?

25 A Yes.

1 Q And these tables show adjustments to the hazard
2 ratios for kidney cancer in table S10 and esophageal
3 cancer in table S11 to account for the six percent greater
4 rate of smoking at Camp Lejeune versus Camp Pendleton
5 based on your COPD analysis; right?

6 A Yes.

7 Q And kidney cancer as reflected in table S10, and
8 this is kind of I think the conclusion at the bottom below
9 the table, the reduction in the hazard ratio for kidney
10 cancer by adjusting for a six percent difference in
11 smoking prevalence between Camp Lejeune and Camp Pendleton
12 would change the hazard ratio from 1.21 to hazard ratio
13 between 1.17 and 1.19; right?

14 A Right.

15 Q So that adjustment for the hazard ratio would
16 have put kidney cancer below the 1.2 hazard ratio
17 benchmark that you used in the study for finding a
18 significant effect?

19 A No. No.

20 Q Okay.

21 A Nothing about significant --

22 Q Okay.

23 A -- at all.

24 Q Okay. Can you explain that.

25 A Highlighting these --

1 Q Oh. Okay. So you're taking --

2 A I'm not trying to make a hard, fast dichotomy
3 between significant and nonsignificant. That is
4 problematic.

5 Q Okay.

6 A That's a part --

7 Q Okay.

8 A Yeah. What I'm saying is -- yeah, you're right,
9 though. I would have highlighted or not highlighted it if
10 it was less than 1.2 in the text.

11 Q Okay. And taking a look at table S11 on
12 esophageal cancer, the reduction in the hazard ratio for
13 esophageal cancer by adjusting for the six percent
14 difference in smoking prevalence between Camp Lejeune and
15 Camp Pendleton would be from a hazard ratio of 1.24 to a
16 hazard ratio of 1.15 and 1.21; right?

17 A Yes.

18 Q So that adjustment would take the lower end of
19 the hazard ratio for esophageal cancer below the 1.2
20 criteria that you used for highlighting findings in this
21 study; right?

22 A Yes, it really depends on what we thought was
23 the relevant risk linking smoking to esophageal cancer.
24 There's a range in the literature, and that's why there's
25 a range in the top of the table.

1 So yes, if you think that the connection
2 between smoking and esophageal cancer is more like four or
3 4.5 or in that range, it would be less than 1.2. If you
4 thought it was much lower than that between smoking and
5 esophageal, then it would have been highlighted.

6 Q Okay. Thank you.

7 A Okay.

8 Q Okay. I think I'm done with the mortality
9 study. I would like you to take out Exhibit Seven which
10 is the Cancer Incidence Study.

11 A Okay.

12 Q Do you have Exhibit 11 in front of you?

13 A Yes.

14 Q Exhibit -- excuse me. What exhibit is it?

15 A Seven.

16 Q Exhibit seven is the Cancer Incidence Study,
17 evaluation of cancer incidents among Marine and Navy
18 personnel and civilian workers exposed to contaminated
19 drinking water at USMC Base Camp Lejeune, a cohort study;
20 correct?

21 A Yes.

22 Q And you are the only listed author on this
23 study?

24 A Yes.

25 Q Did you have any assistance in this study?

1 A Sure. And in the published study that will be
2 published soon, it's been accepted in Environmental Health
3 Perspectives. I list, just, again, the people who are
4 involved in data collection. And again, I thought that
5 they should be -- at the time -- you know, we have a more
6 stricter view of what -- who should be authored at CDC and
7 who shouldn't, and data collection only doesn't fit it.
8 But in the outside world I thought that, you know, this
9 would not have been possible without their efforts, and so
10 that's why they're authors. But I wrote the manuscript,
11 analyzed the data, developed the protocol, did everything
12 else.

13 Q Without any other assistance?

14 A Yes.

15 Q And would it be the same group of people who
16 collected data as were on the mortality study?

17 A April Greek would, Ruth Gatiba would; I'm not
18 sure about Rona Boehm. But then there would have been
19 Betsy Kohler and Recinda Sherman from NAACCR, North
20 American Association of Central Cancer Registries, and one
21 other person from Battelle, Gene Shin who was also helpful
22 in working with the registries and getting them onboard
23 and then doing the data use agreement, so I thought he --
24 that was sufficient for him to be an author, as well.

25 Q And as you mentioned, this has recently

1 successfully undergone peer review at Environmental Health
2 Perspectives and will be published soon?

3 A Yes. They say it's in print, but I don't know
4 what that means anymore.

5 Q Do they actually -- does that journal actually
6 have a print version?

7 A That's what I'm saying. What they said, they
8 e-mailed me saying you can say it's in print.

9 Q Okay.

10 A But I've checked and it hasn't reached the
11 Journal -- I mean, it hasn't been printed or published by
12 the journal.

13 Q For either of the articles that you published in
14 environmental health related to the Camp Lejeune or this
15 particular article in Environmental Health Perspectives,
16 have you become aware of who the Journal's peer reviewers
17 were?

18 A No, but I could. They may -- they may -- if the
19 reviewer allows that, then I may see them.

20 Q Uh-huh.

21 A I do know who the peer reviewers are for the
22 ATSDR peer view process.

23 Q Right.

24 A We find out afterwards who they were. Although,
25 we don't know which review is from who. That's how the

1 ATSDR works.

2 Q Is there any type of conflict of interest
3 analysis that either journal or ATSDR in their external
4 peer review apply?

5 A Yes.

6 Q Do you know?

7 A Yes.

8 Q And what does that involve?

9 A I don't have the document in front of me that
10 describes what the office of science does, but they have a
11 standard conflict-of-interest approach.

12 Q Uh-huh.

13 A So if you were involved in litigation or --
14 yeah. If you're involved in litigation or some other,
15 then are not a peer reviewer. I think that happened with
16 at least one person who is an expert cancer researcher at
17 NCI, but was also involved in the litigation. I think
18 so --

19 Q Okay.

20 A So he would not -- he would not be allowed.

21 Q Do you recall who that was?

22 A Ken Canter.

23 Q Okay. What about having previously received
24 honorary as from the agency that is submitting the
25 article? Is that a conflict of interest?

1 A I'm sure that is. Any -- but I don't know --
2 you would have to talk to our office of science to get
3 the --

4 Q Okay.

5 A I'm not the person who really should be
6 answering that question because I really don't know the
7 details.

8 Q Okay.

9 A I might say something that would be incorrect,
10 so I don't want to do that.

11 Q You're not aware of whether any of the peer
12 reviewers at environmental health that accepted the Camp
13 Lejeune articles or at Environmental Health Perspectives
14 had received honorary from ATSDR, CDC or HHS?

15 A I doubt it because they would have to state
16 that.

17 Q Okay.

18 A And then the journal would probably not allow
19 it.

20 Q This was a retrospective cohort study; is that
21 right?

22 A Yes.

23 Q Would you consider this to be a follow-up on the
24 mortality study that was done in 2018?

25 A No, this is separate. The morbidity study is

1 totally separate. This is a study using cancer registry
2 data covering the entire country. This is a much more
3 rigorous study than a survey.

4 Q Was there any effort to compare the individuals
5 who were a part of this study to those who have completed
6 surveys --

7 A No, there was no effort to do that --

8 Q -- in any morbidity study?

9 A No.

10 Q There was not? Okay.

11 A Again, if you remember this survey, there were
12 quite a number of people who reported the disease that we
13 could not confirm. Here, they're all confirmed. That's a
14 major difference.

15 Q Okay. And again, the numbers in this study are
16 different than the numbers that were in the 2014 study;
17 right? Is that because of the same -- are these the same
18 cohorts that were used in --

19 A Yes.

20 Q -- the mortality study?

21 A Yes. The difference in numbers, first of all,
22 would be -- in the mortality study, you had to be alive up
23 to -- from 1970 and at least up to 1970. If you died
24 before 79, we couldn't follow you because the NDI didn't
25 start until 1979, okay?

1 Q Uh-huh.

2 A So in this case we decided to start follow-up in
3 1996. So if you died before that, you're not included
4 either because all the cancer registries in the country
5 were online with quality data starting in 1996, but the VA
6 wasn't before that. Some other states weren't before
7 that, and so we felt -- we wanted to have universal
8 coverage across the country, so we started in 1996 for
9 follow-up.

10 Q Okay.

11 A And 2017 was the last year when we were doing
12 the matching, the last year that all of them had verified
13 data. They go through a process, you know, and it
14 sometimes takes two years from the time they've collected
15 the data to feel confident in their datasets. So that's
16 why it's -- that's a major reason why there would be
17 differences in numbers, but it's the same cohort. Same.

18 Q Okay.

19 A Yeah.

20 Q That's helpful. So those dates were chosen
21 essentially because of the date of availability?

22 A Right.

23 Q And you obtained as you say in the study
24 information on cancer from the data linkages with 49 state
25 cancer registries as well as the cancer registry of Puerto

1 Rico, District of Colombia and the VA, and Department of
2 Defense?

3 A Yes.

4 Q And I think you mentioned yesterday, there was
5 only aggregate data available from West Virginia?

6 A Yes.

7 Q And Kansas had aggregate data, but somehow you
8 were able to get individualized consent?

9 A They call up patients and got consent from most
10 of the matches, yes.

11 Q And again for this 2024 study unlike the earlier
12 studies that were done in 2014 and 2018, there was no
13 individualized exposure assessment done?

14 A Right, for the same reasons. Yeah.

15 Q The data was available to do an exposure
16 response analysis usually in the same methodology that's
17 used in 2014?

18 A Yes.

19 Q But you just decided not to do it?

20 A Right.

21 Q Was there any exposure response analysis done
22 for this particular study?

23 A Did I do duration, yes. Yeah, so same as the
24 mortality study.

25 Q Based on duration?

1 A Yes.

2 Q Did your understanding of the potential for
3 water exposure at Camp Lejeune from training or other base
4 activities change between 2014 and 2024?

5 A No.

6 Q Okay. In the mortality study you looked at
7 standard mortality rates comparing the cause of death in
8 the cohorts to the general population and then between
9 Camp Lejeune and Camp Pendleton?

10 A Uh-huh.

11 Q In this study you looked at cancer incidents
12 rates; right?

13 A Yes.

14 Q And in looking at cancer incidents rates, you
15 did compare that to the general population.

16 A Right.

17 Q Making adjustments based on sex, race and age.

18 A And then calendar period.

19 Q And calendar period.

20 A Yes.

21 Q So those adjustment were made right. Okay; if
22 you look at table two. You found that? It's on page --
23 Bates page end with.

24 A Let me correct myself here --

25 Q Okay.

1 A Either I didn't put it here or I didn't use
2 calendar period. Yeah, I think I used -- because I used a
3 compilation of rates from CDC Wonder for a period that was
4 reflective of this period, of the follow-up period, and I
5 don't think I looked at five-year calendar period. I
6 think -- at least I'm reading this and trying to remember.
7 Sex, raise and five-year age specific, so just those three
8 variables.

9 Q Okay. But is that different than what was done
10 for the mortality study?

11 A Mortality study, I had calendar period as well.
12 It's a longer follow-up period.

13 Q Okay.

14 A So it made more sense. I think that's the
15 reason.

16 Q So --

17 A Also, the program -- the statistical program
18 used to do this is called Etnam [sic]. It's an IOS
19 program. It spits it out that way and evaluates it that
20 way.

21 Q Okay. So that's the difference here in how
22 the --

23 A Right.

24 Q -- adjustments were done?

25 A Right; yeah, L tests doesn't -- is not used for

1 cancer incidents. They don't have that information in
2 there because package -- it's still package. So I had to
3 do this myself.

4 Q Okay. If you look at table two for the Camp
5 Lejeune Marine/Navy cohort, most of the standard incidents
6 raised for cancers for Camp Lejeune are less than one;
7 correct?

8 A Many of them are, yes. Yeah. Probably the
9 majority of them, yeah.

10 Q There's only a few that are above one; right?

11 A Yeah. I agree. The majority were less than
12 one.

13 Q And if the standard incident rate is less than
14 one, then the Cancer Incidence rate is lower for the Camp
15 Lejeune Marine/Navy cohort than for the general population
16 adjusted for sex, race age; right?

17 A Yes.

18 Q So for example, for bladder cancer, urinary
19 bladder cancer, the Camp Lejeune Marine/Navy cohort has a
20 ten percent lower incident of bladder than the general
21 population controlling for sex, race and age?

22 A Yes.

23 Q And for the Camp Lejeune Marine/Navy cohort,
24 there is a 14 percent lower incidents in Non-Hodgkin
25 lymphoma than the general population controlling sex, race

1 age; right?

2 A 14 percent, yes.

3 Q Uh-huh. And finally for leukemias, the Camp
4 Lejeune Navy/Marine cohort has a 13 percent lower
5 incidents rate of leukemias in the general population
6 controlling for sex, race and age?

7 A Yes.

8 Q And you mentioned in several of your articles
9 that this lower incidents rate than the general population
10 is attributable to the healthy soldier effect; right?

11 A Yes; and the healthy -- well, we haven't talked
12 about workers.

13 Q For the spectrum group the healthy soldier
14 effect. And you cite --

15 A That would also be true for the mortality SMRS.

16 Q For both?

17 A Yes.

18 Q Okay. And I think -- yeah, I think you
19 mentioned it in the mortality study, too.

20 A Uh-huh.

21 Q And you cite a couple of articles on that's, I
22 recall, which is the Clothen article [sic] in 2008 and the
23 waller article in 2011. Do you recall that?

24 A Yeah, I think --

25 Q Did you ever update the research to see whether

1 there are any more recent studies on the healthy soldier
2 effect?

3 A Yes.

4 Q And would the most up-to-date research on the
5 health soldier effect be important for epidemiological
6 studies of cohorts that included military veterans?

7 A Yes.

8 Q Were you aware that in 2023 there have been a
9 Meta-analysis published analyzing the healthy soldier
10 effect for over 2.4 million veterans?

11 A Yes.

12 Q You were aware of that?

13 A Yes.

14 Q What is your recollection of what that
15 particular study showed?

16 A I'd have to say I can't remember.

17 Q Okay. If the study showed a SIR of over one for
18 the 55 to 64 in the 65-to-74 age group, would that have
19 any effect on the conclusions from the Camp Lejeune
20 studies?

21 A Can you re -- so in the Meta-analysis you're
22 talking about --

23 Q Yes.

24 A From the 65 to 64, the SIR was -- or is it SMR?
25 Which one is it?

1 Q SIR over one.

2 A SIR.

3 Q Uh-huh.

4 A If it's over one?

5 Q Uh-huh.

6 A Then that would indicate that there was no
7 healthy soldier effect for that particular cancer or
8 disease.

9 Q Okay. And what were generally the ages of the
10 cohort that are being examined in this study?

11 A We have on page -- two pages; table 1A you have
12 an idea of age distribution. So mean and median age is
13 around 57 at the end of follow-up.

14 Q Uh-huh.

15 A And very few are over the age of 70, and a small
16 minority are over 60 in this cohort. So it's a young
17 cohort again. And so some of these healthy soldier effect
18 would be stronger as in the younger group.

19 Q Uh-huh.

20 A So if you're over 65, probably the healthy
21 soldier effect wouldn't -- if you're under 60, that's
22 where we might see it. The Meta-analysis went from 55 to
23 64.

24 Q Well, they put it into different groups of
25 ten-year periods. So there was a group from 55 to 64, and

1 65 to 74 that showed SIR's of over one.

2 A Right. So they're mixing probably people who --
3 the effect still might be there with people who it
4 probably isn't there. So 55, 64 is a wide range. There
5 are other articles, and we recorded them where there was
6 obvious --

7 Q Uh-huh.

8 A -- healthy soldier effect, so there you go.

9 Q How many of the people in this particular group
10 can you tell from table 1B would have been under age 55?

11 A 1A.

12 Q Oh, 1A?

13 A Unless we're talking about workers.

14 Q Oh, I'm sorry; I'm sorry.

15 A Yeah. So -- well, a median means that
16 50 percent are 57 or less.

17 Q Okay. Yeah, that's helpful. This table is
18 helpful. Thank you.

19 A And we have the same information on table 1B for
20 the workers.

21 Q Okay. How are you doing? Do you want to take a
22 short break?

23 THE VIDEOGRAPHER: The time is 11:03 a.m.

24 We're off the video record.

25 (A recess was taken.)

1 *

2 THE VIDEOGRAPHER: We are back on the record.

3 The time is 11:17 a.m.

4 Q (By Mr. Bain) Okay. Dr. Bove, we're back
5 on the record after a short break.

6 A Uh-huh.
7 (Exhibit Number 26 was marked for Identification.).

8 Q (By Mr. Bain) And I've handed you what has
9 been marked as Exhibit 26. Do you recognize this as
10 an article from Military Medicine on an update on
11 the healthy soldier effect on U.S. Veterans?

12 A Yes.

13 Q And this is Meta-analysis of data that was done
14 in 2023; is that right?

15 A Yes.

16 Q And is this the article that you're referring to
17 that you were familiar with?

18 A Yes. And, in fact, referenced.

19 Q Okay. So is it referenced in the Cancer
20 Incidence Study?

21 A Yes.

22 Q Okay.

23 A I think it may be referenced -- it should be
24 referenced in the mortality study, too. And let me just
25 double-check that. Where is it that I talk about it?

1 I don't see it offhand, but that doesn't
2 mean it's -- I see McLaughlin. Now, maybe it wasn't in
3 this one. It would have made sense to be in here, but I
4 think probably this was written before this came out.

5 Q Okay. What reference number is it in, in the
6 Cancer Incidence Study?

7 A The Cancer Incidence Study, it's 23. But,
8 right, the version there is probably an earlier
9 publication of it.

10 Q Okay.

11 A Of the same thing. It's 2022. And what see
12 here is you don't have page numbers. So it's --

13 Q Preprint version, perhaps?

14 A Not necessarily a preprint version. I'm sure it
15 was peer reviewed, but it's not -- how can I put this?
16 They put it out oftentimes without a page number and then
17 they come back and put a page number. I don't think that
18 would have put it out without peer reviewing it.

19 Q Okay. So I want to direct your attention now to
20 table four of the Cancer Incidence Study.

21 A Okay.

22 Q The Bates number at the bottom is 81225. Do you
23 see that table four?

24 A This is table four here.

25 Q Yeah. I just wanted to refer for the record the

1 Bates number at the bottom. I think it might be under the
2 clip there. It's 81225.

3 A Oh. Because mine says 601 -- I have two.

4 MS. GREENWALD: Yeah, so does mine.

5 THE WITNESS: That's why I was having -- I
6 was trying to figure that out.

7 MR. BAIN: Okay. Maybe I'm using a different
8 version here.

9 MS. GREENWALD: But -- he's using the one I
10 used, and it is the right page.

11 MR. BAIN: Okay. That's fine.

12 Q (By Mr. Bain) So we're referring to table
13 four of the Cancer Incidence Study.

14 A Yes.

15 Q Just to be clear. And this is the table for the
16 Navy/Marine cohort; right?

17 A The subgroup, yes.

18 Q And what do you mean by the subgroups?

19 A The subgroup is those who were -- started active
20 duty in the 1975 or December '74 on. It did not include
21 those people who started active duty before that period.

22 Q Uh-huh.

23 A So the full cohort is in -- the analysis is in
24 the supplemental.

25 Q Okay.

1 A Okay. But we focus on the subgroup again
2 because we didn't have information on where people were
3 before, when the unit code wasn't available.

4 Q Okay; understood. Thanks for that
5 clarification. For this particular group, none of the
6 findings for kidney cancer, bladder cancer or NHL or
7 Leukemia, generally meet the criteria of 1.2.

8 A Yes, that's true.

9 Q They don't meet that criteria; right?

10 A Right, they don't meet that criteria. Right.

11 Q And this is true even though the assessment of
12 evidence identified these diseases in either the category
13 of sufficient evidence of causation or equipoise and above
14 evidence of causation with at least one of the chemicals
15 in the Camp Lejeune water; right?

16 A Right.

17 Q And if you look at table five, which is the
18 table for the civilian workers cohort -- are you there?

19 A Getting there.

20 Q Okay.

21 A Okay.

22 Q The findings for kidney cancer, bladder cancer
23 and Leukemia generally fail to meet the 1.2 hazard ratio
24 criteria; right?

25 A I'm sorry, can you repeat that; took me a while

1 to find it?

2 Q Yep.

3 A To get the table in front of me. So what were
4 the cancers again?

5 Q Kidney cancer, bladder cancer and Leukemias
6 generally did not meet the 1.2 hazard ratio criteria;
7 right?

8 A That's correct.

9 Q That's correct?

10 A Yes, that's correct.

11 Q And some of the findings both for the
12 Navy/Marine cohort and the civilian cohort so incidents
13 rates at Camp Pendleton were significantly greater than at
14 Camp Lejeune; right?

15 A Some.

16 Q Okay.

17 A And you're talking about the adjusted hazard;
18 right?

19 Q Yes.

20 A Yes, was less than one; yes.

21 Q Okay. So if you look at table four, for example
22 --

23 A Uh-huh.

24 Q For uterine cancer, which is on the second page.
25 Do you see that?

1 A The last page of table four.

2 Q Yes. I'm sorry.

3 A Yes.

4 Q It was .49; right?

5 A Yes.

6 Q And if the risk ratio had been calculated as
7 Camp Pendleton versus Camp Lejeune, the hazard ratio would
8 have exceeded 1.2; right?

9 A Yes.

10 Q And the confidence interval ratio is less than
11 and equal to three; right?

12 A Yes.

13 Q If you look at anal cancer -- anus cancer on the
14 previous page --

15 A On the previous page?

16 Q Do you see it towards the top?

17 A Oh, yeah, yeah, yeah. Sorry.

18 Q The hazard ratio is .69; right?

19 A Yes.

20 Q So if the risk ratio had been -- or hazard ratio
21 had been calculated as Camp Pendleton versus Camp Lejeune,
22 it would have exceeded 1.2; right?

23 A Yes; yes. 1.2, yes.

24 Q And the confidence interval ratio is less than
25 or equal to three; right?

1 A Yes.

2 Q Okay. If you look at the civilian cohort, which
3 is table five.

4 A Okay.

5 Q And look at pancreatic cancer, which is halfway
6 down the page. Do you see that?

7 A Yep; yes.

8 Q The hazard ratio for pancreatic cancer was .68;
9 correct?

10 A Correct.

11 Q And again, if the risk ratio had been calculated
12 as Camp Pendleton versus Camp Lejeune, it would have
13 exceeded 1.2.

14 A Yes.

15 Q And confidence interval ratio for pancreatic
16 cancer is less than or equal to three; right?

17 A Correct.

18 Q Okay. Your findings for the Camp Lejeune versus
19 Camp Pendleton for the Marine/Navy cohort that meet your
20 criteria to highlight include larynx cancer, soft tissue
21 cancer and thyroid cancer; right?

22 A Are you quoting from the abstract?

23 Q I believe so, yes.

24 A Acute myeloid leukemia, all myeloid cancers,
25 including polycythemia vera, myelodysplastic, myelo

1 propria syndromes [sic], polycythemia vera, cancers of the
2 esophagus, larynx, soft tissue and thyroid.

3 Q Okay.

4 A From the abstract.

5 Q Okay. I think I'm done with this for now. In
6 the summer of 2022, before the Camp Lejeune justice act
7 was passed, you were receiving a lot of inquires from
8 attorneys about your work; is that true?

9 A A lot? Some.

10 Q Okay. How many would you estimate?

11 A You have to remember when I was working for
12 ATSDR, I would get calls every day from either Marines,
13 former Marines or media and lawyers and journalists and so
14 on. So I have no idea how many lawyers I've talk to and
15 what law firms they belonged to. I didn't ask that
16 question.

17 When people asked me a question about how a
18 study was done, what the health effects of these chemicals
19 are, I answered them regardless of who they are.

20 Q Isn't it true that you concluded that with
21 respect to the hazard or the Cancer Incidence Study, that
22 it was hard to interpret the results because the hazard
23 ratios were not very high?

24 A Yes. I talk about that because -- and when you
25 look at occupational studies, for example, the hazard

1 ratios often are not very high. The Meta-analysis for
2 bladder cancer, for example -- the Meta-analysis while the
3 risk was like -- was under 1.5. For kidney cancer was in
4 the 1.2, the -- close to 1.3; and for Non-Hodgkin
5 lymphoma roughly the same place.

6 So a lot of the -- so even when people who
7 work with this material and likely had a higher exposure
8 to TCE or PCE, you still don't -- and When you do a
9 meta-analysis, you don't see very high hazard ratios.
10 Individual studies you might, but the meta-analysis gives
11 you some indication of where in general the average lies
12 across the studies.

13 Q Would you agree that for this particular study
14 the results of the hazard ratios were not very high?

15 A Right; only for some, and some of the
16 histological subtypes, there may have been I seem to
17 remember. But, yeah; in general, yeah.

18 Q And have you expressed before that the effects,
19 if any, were subtle?

20 A Did I use that term? Probably; yes.

21 Q So let me show you Exhibit -- 27.

22 A I mean, it depends on the cancer.
23 (Exhibit Number 27 was marked for Identification.).

24 Q (By Mr. Bain) I'm Showing you, Dr. Bove,
25 an e-mail chain from 2022 between you and Rich

1 Pinder, and that's been marked as Exhibit 27. Do
2 you see that?

3 A Yes.

4 Q And who is Rich Pinder?

5 A Rich Pinder is a researcher -- he may be retired
6 now, at the University of California -- USC; that's where
7 he is, says so. So University of Southern California.
8 And he's an expert on occupational health studies.

9 And so he was involved to provide some
10 consulting advice. He was part of the contractor; Patel
11 was the contractor. He worked for Patel to provide advice
12 on more the mortality study, not on the Cancer Incidence
13 Study.

14 Q Okay. So let's look at the first e-mail chain
15 which is sent Monday, July 18, 2022. And after an
16 introduction to you, he says: Out here in California, the
17 lawyers are posting away on TV for class action type law
18 suits on Lejeune, so I got to wondering how your analysis
19 is proceeding on the study; I note on the ATSDR this
20 paragraph below, nicely vague, of course; it also has no
21 date when it was written that I can see; just curious
22 results, of course, but also how cancer linkage worked out
23 for you-all.

24 Do you see that?

25 A Yes.

1 Q And on the next page or on the first page of the
2 exhibit which is July 19th, 2022, you respond to him; is
3 that right?

4 A My -- the dates here are July 19th; is that
5 right? July 18th and July 19th is --

6 Q Yeah, so he wrote his e-mail to you on Monday
7 July 18th, 2022.

8 A Okay.

9 Q And if you look back, they're in reverse
10 chronological order.

11 A Right; right.

12 Q You respond to him on July 19th, 2022; right?

13 A Yes. It looks like, yes. Uh-huh.

14 Q And can you just read for the record the
15 paragraphs of your response there?

16 A Okay. So -- okay. Hi, rich it starts with
17 that.

18 Q Yes. if you would read that.

19 A Okay: It's a very busy summer for me, working
20 on these Lejeune studies, well, it's p's -- p-fast study
21 in Ports smith, New Hampshire. I'm also getting calls
22 from lawyers trying --

23 Q Just a minute. If you slow down a little bit,
24 it might be a little easier for the court reporter.

25 A Oh, I'm sorry. It's the coffee.

1 Q Can you start over?

2 A I'll start over: Hi, Rich; this is a very busy
3 summer for me working on these Lejeune studies as well as
4 the P's -- PFAS, P-F-A-S, study, in Portsmouth New
5 Hampshire; I'm also getting calls from lawyers trying to
6 understand what happened at Lejeune and the health effects
7 of the exposures; right now I am working on a draft
8 journal article on the cancer incidents data from the
9 Marines; i hope to enter it into the agency clearance
10 process by the end of this month; I have also pretty much
11 completed the analysis of the mortality data for the
12 Marines; of course, it is hard to predict how long the
13 agency's clearance process will take before I can submit
14 articles to the journals; I am still waiting to get the
15 cancer incidents data from the DOD registry; we are almost
16 there, but the DOD bureaucracy is taking its time; I learned
17 a few months ago that I will have to do the linkage for
18 the DOD data because the DOD registry no longer does
19 linkages; it's not clear to me what the DOD registry
20 actually does; I am hoping that most of the cases that I
21 find in the DOD case data were also reported to the state
22 so I will not have to redo an analyses because I already
23 have the cases, but that's just --

24 Q Let just stop there for a minute.

25 A Yeah.

1 Q What did you find with respect to the DOD data
2 with respect to that comment you made?

3 A Yeah, I found about 500 and change new cancers
4 that were not reported to the states for some reason, and
5 weren't in the VA database, either, so I had to redo the
6 analysis.

7 Q Okay. Can you go ahead and read the next
8 paragraph?

9 A It is taking me a long time to analyze the
10 cancer incidents data for the Marines because of the sheer
11 size of the data and the complexity of the cancer data.
12 For example, I have insight two cases as well as malignant
13 cases for many of the cancers; also, an individual can be
14 diagnosed twice for the same cancer in the same year;
15 there are also recurrent cases as the same cancer diagnose
16 several years apart; then I am analyzing histologic
17 subtypes as well as cancer sites, so I analyze the data
18 several different ways; the results do not differ
19 appreciably among these analyses, and it's hard to
20 interpret the results because the hazard ratios are not
21 very high; that is, the effects are subtle as may be we
22 would expect given the exposures were probably lower than
23 occupational exposures for most of the Marines and the
24 risk ratio for TCN workers and cancers are not very high,
25 either.

1 Q Okay. So does that summarize what you were
2 finding at that particular time in some of the analyses
3 that you were doing with the data?

4 A Yeah; yes.

5 Q Okay. And do you recall writing your brother
6 Richard from your ATSDR e-mail address stating: I'm
7 getting calls from lawyers and retired Marines even before
8 the recent legislation became law; I am concerned that my
9 study may not be helpful to the court battles; although, I
10 do have findings, they are not spectacular but instead are
11 quite subtle effects.

12 A Yes. I probably said something like that.

13 Q Okay. Okay. I'm going to go to back to cancer
14 incidents study. Sorry about that.

15 A Okay.

16 Q Okay. That's Exhibit Seven. So looking back at
17 Exhibit Seven.

18 A Uh-huh.

19 Q You mentioned that you did a secondary exposure
20 response analysis based on duration at Camp Lejeune;
21 right?

22 A Right.

23 Q And you had grouped individuals into low/medium,
24 medium/high, and high exposure groups for the Navy/Marine
25 cohort, and low, medium and high for the civilian worker

1 cohort based on the number of quarters the individual
2 spent at Camp Lejeune?

3 A Yes; for the preprint. I would have to say that
4 the published article, because of the reviewer's comments,
5 they asked me to reduce the number of categories. So for
6 Marines, it's medium and -- let me just see how.

7 Q Okay.

8 A Hold on one second. I need to be accurate here.
9 Let me just double-check. Yeah, so for Marines -- that's
10 right. So instead of medium -- medium and medium high,
11 those were conflated. So slow, medium and high now in the
12 published article. And also for the workers, I reduced it
13 to low and high probably.

14 Q Okay.

15 A And so I had to -- because of small numbers, the
16 reviewers thought that the numbers were just too small to
17 break it down that way and I agreed, so the journal -- the
18 other change in the journal articles, there was no SIR's
19 in the journal article. They were -- they said that it
20 doesn't really add anything to the study because poisson
21 regression results are very similar to the hazard ratio
22 results, which they should be.

23 And so they said, you have too many table.
24 And so they're no longer in here either; okay? So, you
25 know, so the SMR's are still in that, but in this one it's

1 just going to be the hazard ratios and the duration, and
2 that's the only change. The quantitative biased analysis
3 did not change.

4 Q So there's going to be no table in the published
5 version showing how the incidences of these cancers at
6 Camp Lejeune compare to the general population?

7 A General population, no, there won't be.

8 Q And whose decision was that?

9 A That was -- well, it's my decision based on the
10 comments from the reviewer. I have a feeling that if I
11 didn't do that, it wouldn't have gotten published.

12 Q Was it just a matter of space or they didn't
13 think the analysis was significant or --

14 A Both.

15 Q Okay.

16 A Yeah. They were -- yes. They also wanted me
17 to -- and I'll say this, too. They wanted me to put the
18 confidence interval ratio itself in the tables, so you
19 will see that in the published version. So you don't have
20 to calculate them, but they'll be there. That again was
21 another reviewer.

22 So this thing went true, I would say, two
23 different peer review processes within the journal; okay?
24 Not to mention the ATSDR peer review. So I got comments
25 from -- I'm assuming they're the same reviewer, but I

1 don't know their names or anything. But I got comments.

2 And then there was a second round of
3 comments that I got right after I retired. And so I'm not
4 sure which one -- which set, where I had to take SIR's
5 out, whether it was the first set or the second set.

6 There were also some comments about
7 discussing more about breast cancer, so there's more of
8 that in here, in the journal article. And the -- yeah.
9 And I think I did a quantitative biased analysis separate
10 for one -- either a female breast cancer or a male breast
11 cancer. I'm trying to remember.

12 So these again, I'm responding to these
13 peer reviewers. So I just want to make you aware that
14 this -- although this is a good reflection of what the
15 published article is, there are some differences.

16 Q So in some way this is more comprehensive than
17 the published article because it includes more data?

18 A It includes more data but, again, it doesn't
19 really add because the -- unless you're really interested
20 in comparing Camp Lejeune to the general population, which
21 I think is problematic, the poisson regression results
22 comparing Lejeune and Pendleton are pretty similar to the
23 hazard ratio. And again, you would expect that because
24 poisson regression and Cox Model are very strongly
25 related, so just letting you know.

1 Q Okay. I appreciate that.

2 A Yeah.

3 Q While we're on that topic, are you aware of
4 whether there's going to be any type supplemental
5 responsive publication that Environmental Health
6 Perspectives is going to put out in relation to this
7 study?

8 A I was told that they were going to have some --
9 they were going to invite someone to give a perspective on
10 the study.

11 Q Uh-huh.

12 A Which is good because then it has more
13 visibility when that happens.

14 Q And is that -- is that a typical practice in
15 studies --

16 A Yes.

17 Q -- of this type?

18 A Well, not all studies. They try to highlight --
19 if you look at Environmental Health Perspectives, the
20 first part are invited perspectives on the research that
21 they publish in that journal. But not -- but only for
22 some. And so that they -- in the sense they're
23 highlighting the research that they want to highlight by
24 doing that. And so I was thankful that they're doing
25 that.

1 Q Do you know who the author of that perspective
2 is?

3 A No. And I don't know if it's going to be good
4 or bad. I'm hoping, you know, he doesn't -- or she
5 doesn't pan the study.

6 Q Do you have any idea when that's going to be
7 published?

8 A No. No; they haven't said to me.

9 Q Okay.

10 A It's very difficult working with Environmental
11 Health Perspectives for this reason. They take a long
12 time to make a decision. They went through two different
13 peer review processes. It's much easier to work with
14 other journals I would have to say.

15 Q Okay. I just want to ask a few quick questions
16 about the exposure response analysis, and we'll use the
17 one that's in the exhibit that we have since we don't have
18 the published --

19 A Right.

20 Q -- version.

21 A Yes. Sorry.

22 Q For the Navy/Marine cohort which is table six --

23 A Right.

24 Q You report a monotonic exposure response trend
25 for thyroid cancer; right?

1 A Yes, and I remember doing that. Let me just
2 pull it up.

3 Q But there was not any other monotonic exposure
4 response trends for the other cancers; is that true?

5 A I think that was the case, yes.

6 Q So no such trend for kidney cancer, bladder
7 cancer, NHL or any Leukemias; right?

8 A Certainly not for bladder cancer; certainly not
9 for kidney. What was the other one you wanted --

10 Q NHL and Leukemia.

11 A NHL, definitely not; and Leukemia -- where is
12 Leukemia? I'm having trouble seeing this. Is Leukemia on
13 the next page.

14 MS. GREENWALD: The third -- the top of the
15 third page.

16 THE WITNESS: Yeah, here we go. No.

17 Q (By Mr. Bain) Okay.

18 A It's non-monotonic.

19 Q Okay. And if you go to the next table which is
20 the civilian worker cohort, you reported a monotonic
21 exposure response trend for large B-Cell lymphoma; right?

22 A Diffuse Large B-Cell, yes.

23 Q And there were not any other monotonic exposure
24 response trends for any other cancers; do you recall?

25 A I don't recall. I would have to look at the

1 text.

2 Q Okay. Well, let's focus, then, on kidney,
3 bladder, NHL and Leukemia --

4 A Okay.

5 Q Which are the ones we --

6 A Right.

7 Q -- talked about before.

8 A So not monotonic -- I mean, non monotonic, but
9 for kidney, bladder -- so that's -- yeah, both. It's non
10 monotonic. And what was the third one? Leukemia --

11 Q NHL and Leukemia?

12 A Yeah; yep. Not monotonic, and Leukemia is not
13 monotonic.

14 Q So not monotonic for any of those?

15 A Yes; uh-huh.

16 Q Okay. Now I am done with this I'm pretty sure.
17 During the course of your research, did you communicate
18 frequently with Camp Lejeune activist Jerry Ensminger and
19 Mike Partain?

20 A Yes. They're part of the Cap, yeah.

21 Q Okay. And would you communicate with them
22 frequently by e-mail?

23 A Yes; you sure?

24 Q Do you have any idea approximately how many
25 e-mails you exchanged with Jerry Ensminger and Mike

1 Partain?

2 A Over the year?

3 Q Yeah.

4 A No idea.

5 Q Okay.

6 A Many times. They have a lot of questions about
7 studies; a lot of questions about health effects. They
8 get calls from retired Marines asking them about
9 particular disease and then they forward that to me.

10 Q Okay.

11 A So I answer a lot of questions about diseases
12 that I have to look up sometimes to see if there's any
13 evidence for that particular disease and these chemicals.
14 So that's been an ongoing thing.

15 They're also interested in breast cancer.
16 Of course, Mike Partain is interested in breast cancer,
17 and so they were interested in what new literature was
18 available on the issue. So I did send them some articles
19 that have been published since 2016 on male breast cancer
20 and female breast cancer.

21 Q Do you ever recall Jerry Ensminger sending you
22 some information about potential Navy funding of ATSDR
23 studies and asking you to keep that information from ATSDR
24 leadership?

25 A No, I don't recall that.

1 Q Okay.

2 A But --

3 (Exhibit Number 28 was marked for Identification.).

4 Q (By Mr. Bain) Dr. Bove, I'm showing you an
5 e-mail --

6 A 2009.

7 Q From 2009 between you and Jerry Ensminger and
8 Morris Maslia is also a cc on it. Do you see that?

9 A Yes.

10 Q If you can take a minute to take a look at this.

11 A Now, what part are you interested in?

12 Q Well, if you start at -- to get context, you
13 probably should start at the bottom which it appears to be
14 you're being forwarded an e-mail between Jerry Ensminger
15 and a staffer for Senator Burr regarding Navy funding of
16 ATSDR studies; do you see that?

17 A Yeah; yes. So he -- Jerry contacted Brooks
18 Tucker. Okay. And then Jerry e-mails me; right? Okay.

19 Q Jerry e-mails to you. He says: Frank, here is
20 what is happening. As of this morning I am giving you
21 this so you and Morris can get a jump on putting your
22 funding estimates together; don't be too conservative and
23 please don't share this with anyone but you and Morris and
24 tell Morris to keep this quiet; I don't want Frumkin and
25 Sinks to know about this until we get the letter because I

1 don't trust them and I am fearful that they will telegraph
2 to the DON; Jerry.

3 Do you see that?

4 A Yes.

5 Q And do you see the e-mail, then, that you
6 forward to Morris saying, see below and keep this between
7 us and Jerry?

8 A Yes.

9 Q Okay. Do you recall what this was all about?

10 A There were battles between the agency and the
11 Department of Defense, the Navy -- and the Navy is the
12 primary person here, entity here -- around funding, a
13 continued funding of the water modeling -- I think that
14 was part this -- and also funding for the mortality
15 studies that were published in 2014.

16 There were -- I can't remember exactly what
17 happened, what the situation was here, but there were
18 battles with the Navy around funding for the Cancer
19 Incidence Study as well. But this was before that.

20 There was also issues around the health
21 survey and how that was going to be. So I'm trying to
22 think of what -- but I think it could have involved all of
23 that --

24 Q Uh-huh.

25 A -- funding. And so what Jerry is doing here, if

1 you -- so you want me to answer? What Jerry is doing here
2 is trying to gather support from the Senator to put some
3 pressure --

4 Q Uh-huh.

5 A -- you know, on the Navy to fund the studies.
6 And this has happened several times for us to get the
7 money in a timely fashion, so that's what this is all
8 about.

9 Q Do you think it was appropriate to work with Mr.
10 Ensminger in this way and, you know, purposely keep your
11 superiors at ATSDR in the dark?

12 MS. GREENWALD: Objection to form.

13 THE WITNESS: There were differences of
14 opinion within the agency at this time. If you
15 remember, the NRC report, the prepublication --

16 Q Uh-huh.

17 A Came out three, four months before this e-mail,
18 these e-mails. And that had a big impact on ATSDR
19 leadership. And we had to educate them as to why that
20 shouldn't have been a big impact. But at the time we were
21 still in the heat of discussions internally about the
22 implications of that NRC report.

23 So that's -- and so there was some distrust
24 because there was pretty --

25 Q Uh-huh.

1 A -- strong discussions about it. So I think that
2 that's what's going on here.

3 Q Okay.

4 A But they -- you know, we did resolve our
5 differences eventually; the studies proceeded.

6 Q Okay. And that brought up one other thing I
7 wanted to ask you about --

8 A Uh-huh.

9 Q -- because yesterday you mentioned that the NRC
10 report had been funded by the Navy. Isn't it true that
11 ultimately all of the ATSDR reports on Camp Lejeune were
12 also funded by the navy?

13 A Yes, but what I said was that the questions that
14 the NRC responded to in their document were questions from
15 the navy. That's my understanding. I've never seen a
16 document that said that explicitly, but that was what I've
17 been told.

18 Q Okay.

19 A Yes, of course, we've been funded by the Navy.

20 Q So you see the discussion as the Navy kind of
21 directing NRC through the questions; whereas, ATSDR was
22 more independent?

23 A We were independent.

24 Q But you were funded by the Navy.

25 A We were funded by the -- but we were totally

1 independent.

2 Q Okay.

3 A We made that clear to the public as well as to
4 the Navy.

5 Q Okay. I have one more exhibit. And then I
6 think I'm almost done.

7 (Exhibit Number 29 was marked for Identification.).

8 Q (By Mr. Bain) Dr. Bove, I'm showing you
9 what has been marked as Exhibit 29. And this is an
10 e-mail from you to jerry Ensminger dated January
11 4th, 2007, and the subject is a list of NAS
12 candidates. Do you see that?

13 A List was NAS candidates, okay. Yes.

14 Q And in this e-mail you state to Mr. Ensminger:
15 The epidemiologists I think are the best for the job; have
16 an asterisk before their names and are in bold; I also
17 lists some public health generalists who would be good on
18 the issue; finally, I lists some toxicologists, but I
19 don't know many; you may want to ask Dick Clapp or Dave
20 Ozonoff or dan --

21 A Wartenberg.

22 Q Wartenberg. Do you see that?

23 A Yes.

24 Q And there's an attachment here, which is the
25 list of possible NAS panel members? Do you see that?

1 A Yes.

2 Q And did you compile this list for Mr.Ensminger?

3 A I must have. I'm trying to remember what this
4 was about.

5 Q Was this --

6 A I can't -- what's confusing to me here is why
7 would Mr. Ensminger be asked by the NAS to come up with
8 potential candidates? So that's what's confusing to me
9 here. So in other words, I don't know the context of what
10 we're talking about here.

11 This is a good list of epidemiologists and
12 biostatisticians who have done work with communities in
13 the past so that they have a good feel for that kind of --
14 doing that kind of work; although, some aren't like David
15 Savitz, for example, or Howard -- well, some of the --
16 Andrew Olshan may not have, looking over this list --
17 Matthew Longnecker wouldn't either. So anyway, so I'm not
18 sure what the context was, why would -- but this could be
19 a good list for the NRC report. I wish they had used it.

20 Q When you put asterisks and bold certain names,
21 are you indicating that they're familiar with working with
22 communities, or what's the reason for doing that?

23 A They know the subject matter, TCE and PCE;
24 they've done studies and they've worked with communities,
25 yes; so all three.

1 Q And in this e-mail you refer in a couple of
2 places to people who, quote, "can be trusted". What do
3 you mean by "can be trusted"?

4 A Can be trusted to work with communities.

5 Q Okay.

6 A Can gain the trust of the community, for one
7 thing, and be trusted because they've worked with
8 communities in the past. A lot of epidemiologies, you
9 know, a lot of public health people unfortunately don't
10 have that experience working with communities either in
11 studies or in other aspects of the public health
12 activities. These people do.

13 Q And would you also say that these are people who
14 embrace advocacy and activism?

15 A Some do; so don't.

16 Q Okay.

17 A But that wasn't the consideration. It was, can
18 they work with communities, and that was the question.

19 Q Okay.

20 A For example, some that I didn't asterisk and in
21 bold have done advocacies, for example. So that wasn't
22 the primary thing.

23 Q Have you spoken with the plaintiffs' attorneys
24 in this case?

25 A I think I was called by some of them, yes.

1 Q Can you recall any of the attorneys' names?

2 A No. I can't recall, no.

3 Q Have you ever spoken with any of the plaintiffs'
4 attorneys in this room before yesterday; do you know?

5 A Again, if I did, I don't recall. You know, my
6 problem is I don't remember names; okay? So, and I get a
7 lot of calls, and so I don't remember which lawyer and
8 their names. But I assume that I was talking to some
9 plaintiffs' lawyers, yes.

10 Q Have you entered any agreements with the
11 plaintiff lawyers?

12 A No.

13 Q And do you have any intent to do any consulting
14 or expert work in this case?

15 A No.

16 Q Okay.

17 MR. BAIN: That's all the questions I have
18 right now.

19 MS. GREENWALD: Okay.

20 MR. BAIN: I might have some more later. I
21 think I still have some time left.

22 MS. GREENWALD: Can we take a five,
23 ten-minute break so I can get my thoughts
24 together? What do you want to do? Do you want to
25 power through so you can get out of here?

1 THE WITNESS: It would be nice to power
2 through.

3 MS. GREENWALD: Okay. No, no. I'm fine with
4 that.

5 THE WITNESS: Okay.

6 MS. GREENWALD: I just want to make sure if
7 that makes sense. I just need a few minutes to
8 gather my cards.

9 THE WITNESS: Sure.

10 THE VIDEOGRAPHER: The time is 11:56 a.m.
11 Going off the video record.

12
13 (recess.).

14 *

15 THE VIDEOGRAPHER: We are back on the record.
16 The time is 12:20 p.m.

17 DIRECT EXAMINATION

18 BY MS. GREENWALD:

19 Q Hi, again, Dr. Bove. I have not too long of
20 questions for you just to go over some of the issues
21 you've been going over with the government.

22 A Uh-huh.

23 Q So A lot of the questions you've been asked by
24 the government have focused, would you agree, on
25 limitations of the various studies you've done on behalf

1 of the government relating to Camp Lejeune?

2 A Many, yes.

3 Q Okay. In each of the studies you've done for
4 Camp Lejeune have clearly laid out the limitations of the
5 study as you saw them; right?

6 A Yes.

7 Q And every single one of them I think that was
8 identified, you were able to show that that was actually
9 in this study?

10 A Sorry. Rephrase that.

11 Q The limitations that were gone over, there was
12 text in all of these studies?

13 A Yes; yes. Okay.

14 Q Okay. And is it fair to say that some if not
15 most of the limitations could have been addressed if the
16 Navy or Marine Corps had given you more specific
17 information about the cohort's dates on basic Camp
18 Lejeune?

19 A Some of the limitations; some are inherent in
20 mortality studies, for example, so that they have nothing
21 to do with the Navy or anything of the sort or the --
22 mortality is not the best way to look at the cancers, for
23 example. So there are limitations.

24 And there are going to be limitations --
25 whenever you compare the Marines or the workers with the

1 general population there will always be limitations on
2 those comparisons.

3 Q But if you want to compare Camp Lejeune cohorts
4 to Camp Pendleton cohort and you're focusing on time on
5 base, it would -- the more information you could get from
6 the Navy or the Marine Corps the better in understanding
7 time on basis, for example, of people at Camp Lejeune;
8 right?

9 A Time on base, but even more so having verified
10 where barracks, units where barracks are at the base
11 because the only way we got that information was from the
12 memories of retired Marines, and it would have been nice
13 to have the Marine Corps verify that.

14 Q And you asked for that information along the
15 way, didn't you?

16 A We asked, yes.

17 Q In fact, I recall you testifying yesterday
18 something to the effect that you could not count on the
19 Marine Corps to give you information that you needed and
20 that you tried to get that information from other sources
21 because you couldn't get it from the Marine Corps; is that
22 fair?

23 A In this case, for example, trying to find out
24 where units were Barracked, yes.

25 Q Okay. If I told you that the Navy kept

1 chronological service logs from Marines at Camp Lejeune
2 that would actually reflect, for example, when they're on
3 deployment, is that a document that would have helped you
4 to determine when people at Camp Lejeune were actually
5 away from Camp Lejeune?

6 A No. They gave us the chronologies, okay. It's
7 the muster rolls that would be important for that. The
8 chronologies I didn't find very useful at all except I saw
9 when -- for sure when the 8th Marines moved to Geiger
10 because in 1980 the document said that they were there.

11 Q Uh-huh.

12 A Or had some kind of event. These -- but the
13 ones we got, anyway. We were told that there was going to
14 be a lot of good information in these, but they didn't
15 seem to help much at all except that and also when women
16 were moved. Those are the two. So those command
17 chronologies as they're called, I didn't -- I think
18 they're probably in one of the file folders, were not very
19 helpful.

20 Q Did you ever see individualized service jackets?

21 A No.

22 Q On Marines? So would it have been useful, for
23 example, for you to have information -- if someone, say,
24 for the longer duration at Camp Lejeune, say, 18 months,
25 would it have been useful for you to know that out of

1 those 18 months, eight months of those were on deployment
2 and they weren't even at Camp Lejeune?

3 A Absolutely.

4 Q Okay. And that's information that you would
5 have liked to have gotten from the Marine Corps for your
6 studies; right?

7 A Right. And they said if you can get -- you
8 know, we have muster rolls, but they're -- at the time
9 they were hard copy and not very accessible to us anyway.
10 And I think to some extent between us and the VA wanting
11 more information to handle the VA for handling claims,
12 pushed the Marine Corps to at least computerize it so that
13 you could do an individual-by-individual search of the
14 muster rolls, but it was just impractical to do that for
15 150, one hundred -- 200,000 Marines. The database
16 wouldn't have helped us.

17 Q You're talking about the muster rolls?

18 A I'm talking about --

19 Q And not the other --

20 A -- the muster rolls.

21 Q Okay.

22 A Yes, I'm talking about the muster rolls.

23 Q Okay. And if they had given you a map of the
24 base and told you where units generally were located on
25 the base so that you could know where various Marines

1 would have lived versus trained, would that also have
2 assisted you in --

3 A Sure; yes.

4 Q Okay. You didn't get anything like that from
5 the Navy or the Marine Corps, did you?

6 A We got no information on where the units were
7 barracked; no information on where units trained.

8 Q And that's information that you asked for;
9 right?

10 A We asked for the first. I don't recall whether
11 we asked for the second. We assumed that they didn't have
12 that if they didn't know where units were barracked.

13 Q Okay. Did I understand you correctly yesterday
14 that the navy would get copies of your studies before they
15 went on the website a few days before, or did I
16 misunderstand that?

17 A No, no, no. We had an agreement with the Navy
18 that we would give them advanced copies. That was true of
19 the water modeling. Actually for the water modeling, we
20 went down -- down. We went up to Washington and briefed
21 the general -- the commandant or whatever I think it was a
22 day or two before we released Tarawa Terrace; went through
23 it all with them. They had the document and so on. So
24 this was something we did.

25 I wasn't a great fan of this, but we did

1 this so that they -- they insisted on this because they
2 wanted to be prepared for the media and I understood that.

3 Q Okay. So they would get the copies; then they
4 would get the studies -- your studies and final form
5 before they were made available to the public?

6 A Yes.

7 Q Did anyone from the Navy ever say to you, you
8 made this mistake here or did you consider this factor or
9 did you know that those people actually weren't on base at
10 that time or anything? Did anyone give you any
11 feedback --

12 A Well --

13 Q -- on improper facts or assumptions that you
14 made in your studies?

15 A Well, when we briefed -- they had the document.
16 When we briefed the Navy about the Cancer Incidence Study,
17 for example.

18 Q Uh-huh.

19 A There was a comment from one of the Navy doctors
20 who's also an epidemiologist claiming that the analysis
21 was not done right or something, you know, and we
22 explained to him that he was incorrect.

23 So we have -- we did receive comments. So,
24 and they couldn't have done that without having received
25 the document beforehand. So they -- we briefed them the

1 same day; we briefed the Cap, but they had the document
2 before; the Cap did not.

3 Q And so back to the example that I gave about,
4 for example, if you would have had deployment records --

5 A Uh-huh.

6 Q -- so that you would know that someone who you
7 factored in for 18 months -- this is just a hypothetical.

8 A Uh-huh.

9 Q You would -- someone there for 18 months but, in
10 fact, they were only there for half of that time because
11 they were deployed the other time. So if you included
12 that entire time, that would bias the results to the null;
13 is that right?

14 A Well --

15 Q Typically?

16 A If you're doing a duration where you have
17 multiple categories not just yes, no --

18 Q Uh-huh.

19 A -- it's hard to know which direction -- how the
20 trend would look. Exposure misclassification like that
21 when you have multiple categories, the trend could go in
22 any which way, direction.

23 So, and oftentimes it goes like that
24 (Indicating), which is -- a lot of the lines --

25 Q Uh-huh.

1 A -- look like that, which you would expect with
2 exposure in this classification, but you really can't
3 predict. If it's just exposed versus unexposed, you can
4 predict, well, that it's biased towards the null almost
5 always, virtually always. But for -- when you have the
6 low, medium and high, then you don't know.

7 Q Let me -- maybe, I don't understand this. But
8 if you're there for 18 months and nine months of that time
9 you're unexposed --

10 A Right.

11 Q You're doubling the time of exposure; right?
12 When, in fact, half of that time there was no exposure.

13 A Right. So --

14 Q Okay.

15 A So I would have put -- so let's say that person
16 because of that long duration is in the high duration --

17 Q Uh-huh.

18 A -- period.

19 Q Right.

20 A Well, they shouldn't be there. And so their
21 risk -- if there is a risk -- I caveat that. If there is
22 a risk, you're going to be lowering the risk in the high
23 exposure group -- this person should have been in here.
24 So you're going to get a curve like this (indicating).
25 See.

1 So that's what I'm saying, when -- that's
2 oftentimes what happens with exposure misclassification,
3 when you have more than one -- more than two categories,
4 yes or no.

5 Q And when you're comparing it to Camp Lejeune,
6 though, it would matter; right? Because no matter what,
7 everyone at Camp Lejeune is assumed unexposed.

8 A Everyone at Camp Pendleton.

9 Q Everyone at Camp -- I'm so sorry. Wow.

10 A Yeah; okay.

11 Q Everyone at -- forgive me. Everyone at Camp
12 Pendleton is assumed unexposed.

13 A Yes.

14 Q So then would it not bias to the null if you're
15 comparing the data for Camp Lejeune to the data at Camp
16 Pendleton, and you have over --

17 A Yes.

18 Q And the assumptions overstate the exposures of
19 people at Camp Lejeune?

20 A Right. So exposure misclassification operates
21 differently when it's just a yes, no, exposed, unexposed
22 situation.

23 Q Uh-huh.

24 A Versus a low, medium, high, whatever; several
25 categories. The several categories, the trend often is

1 what I -- it goes up and then comes down because you put
2 people in the high exposure usually that don't belong
3 there.

4 When you do a yes, no or exposed,
5 unexposed, as I said virtually always goes towards the
6 null. There are rare occasions where it doesn't, so we
7 often say, most likely, to cover the fact that it might
8 somehow go away from the null. Probably if other factors
9 are influencing the situation.

10 Q Okay. Would you agree with me that there's no
11 perfect epidemiological study?

12 A Yes.

13 Q Okay.

14 A Unfortunately.

15 Q And I guess I'm -- having been an environmental
16 lawyer my whole life, I want to ask you about this because
17 isn't that -- I mean, there's epidemiological studies in
18 the context of a controlled -- a clinical trial, for
19 example.

20 A Uh-huh.

21 Q Which, of course, has a lot more controls and a
22 lot more inherent accuracies because you actually can make
23 sure that you know what people are being exposed to and
24 what your controls are not exposed to; right?

25 A Yeah, but you randomly assign which hopefully in

1 the average will eliminate confounding. Not always. And
2 that's why there are -- even clinical trials have some
3 limitations.

4 Q But an environment cohort --

5 A Yes.

6 Q -- is a much more complex --

7 A Yes.

8 Q -- and more uncertain study.

9 A Yes.

10 Q Right? Is that fair?

11 A Sure; yes.

12 Q Okay. And would you also agree that it would be
13 impossible to -- impossible to perform a clinically
14 controlled trial to determine the effect of a chemical
15 because that would be unethical to test on a human being?

16 A Oh, yes.

17 Q Okay. So that when you're doing epidemiological
18 studies involving environmental pollution and impacts on
19 populations, certain limitations are pretty impossible to
20 avoid such as specific memory of what you're exposed to at
21 any given time in the past; right?

22 A That's -- yeah. Exposure misclassification i
23 would say is endemic in occupational and environmental
24 epidemiology because even in a workplace you don't know if
25 someone is working harder, someone's wearing their

1 protective equipment properly, so on and so forth.

2 Q Uh-huh.

3 A And in the case of Camp Lejeune, the issues
4 include deployment, whether they used the water, how much
5 they used and so on.

6 Q Right. But your -- epidemiological studies like
7 yours employed many well-established data gathering and
8 statistical tools to limit some of these limitations;
9 right?

10 A Yes. Yes.

11 Q But they also recognize that they all can't be
12 avoided.

13 A Right.

14 Q Okay. Do you recall getting an award from the
15 ATSDR in March of 2019?

16 A I think so, yes.

17 Q I can tell you what it is.

18 A It's a science award, yes.

19 Q It's the NCEH ATSDR --

20 A Yes.

21 Q -- honor Award.

22 A Yes.

23 Q It's the director's award for excellence and
24 outstanding contribution. That was March 2019.

25 A Right.

1 Q NCEH is National Center for Environmental
2 Health?

3 A Yes.

4 Q So it was a joint honor?

5 A Right.

6 Q Okay. And I think you told Mr. Bain yesterday
7 that well over half of your work at ATSDR was related to
8 Camp Lejeune; right?

9 A Right.

10 Q And in the period of -- around the time you're
11 getting this award from the ATSDR, is the majority of your
12 work in the area of March 2019 surrounding --

13 A Yes.

14 Q -- the same, over 50 percent of Camp Lejeune?

15 A It may have been 50/50 because I was also
16 working on a PFAS feasibility assessment for the
17 Portsmouth study and working on the protocol for the PFAS
18 study and attending Cap meetings up in New Hampshire. So
19 taking that all into account or at least it -- yeah,
20 it's -- 2019 is before the Pandemic, yeah. Probably
21 50/50.

22 Q Do you remember the award -- is there an award
23 ceremony or an award that you get on a -- I mean, how does
24 this play out?

25 A Yeah, there was something. I didn't keep these

1 things. But, yes, there's a presentation. It was
2 during -- because we have an awards ceremony, and this was
3 one of the awards given out, but it's the only one for
4 science.

5 Q Okay.

6 A Okay. And -- yeah.

7 Q So this is the only award for science in that
8 given year.

9 A I think so, yeah.

10 Q That you received.

11 A Right.

12 Q Okay. And we've talked a little bit about the
13 NRC, and I don't want to go -- belabor the NRC, but you
14 weren't the only critic of the NRC report; right?

15 A Right.

16 Q So I'm going to -- do you know who
17 Dr. Aschengrau is?

18 A Yes.

19 Q Did you ever see a copy of her statement about
20 the inadequacies of the NRC report?

21 A I'm not sure I did.

22 Q I'll give you a copy of this?

23 A I know the Cap members wrote something, and I
24 don't know if I saw hers.

25 Q Well, in fairness, she's one of several

1 signatories.

2 A Oh, okay. I may have seen it.

3 Q Oh, I'll give you a copy.

4 MS. GREENWALD: What are we up to, 29?

5 MR. BAIN: This is 30.

6 MS. GREENWALD: Oh, okay.

7 Q (By Ms. Greenwald) So I'll show you what's
8 been marked as Exhibit 30.

9 A Okay.

10 (Exhibit Number 30 was marked for Identification.).

11 Q (By Ms. Greenwald) I ask for you to take a
12 look at that and tell me if you've seen that before.

13 A Yeah, I think I've seen this before.

14 Q Okay.

15 A Yeah.

16 Q And they like you conclude that this report was
17 two years in preparation by scientists, many of whom we
18 know and respect, that reached puzzling and in some cases
19 erroneous conclusions. Do you see that in the top
20 paragraph about the middle?

21 A Puzzle, yeah. Okay.

22 Q Would you agree with that?

23 A Yes.

24 Q Okay. And then the first sentence of the next
25 paragraph, specific areas where we disagree with the NRC

1 report include their assessment of the water distribution
2 modeling, their assessment of the risk caused by exposure
3 to two of the principle contaminants, paren, (TCE and
4 PCE), and the likelihood of conducting meaningful
5 epidemiological studies in this setting. We view the
6 water modeling undertaken by ATSDR and its consultants as,
7 quote, "state of the art" and worth carrying through the
8 completion so that it can be used in the ongoing and
9 proposed health studies.

10 Do you see that?

11 A Yes.

12 Q Do you agree with that?

13 A Yes.

14 Q Okay. And a couple of sentences down: We also
15 agree with the National Toxicology Program, the TCE and
16 PCE are reasonably anticipated to be human carcinogens and
17 reject the characterization of the evidence as, quote,
18 limited, slash, suggestive, close quote, as presented in
19 the NRC report. We note that this characterization of
20 solvent mixtures actually steps back from previous work
21 done by the National Academy of Sciences Institute of
22 Medicine in 2003.

23 Do you agree with that?

24 A Yes.

25 Q Last but not least, the NRC doubts -- it's a

1 couple of sentences down.

2 A Yep.

3 Q The NRC doubts that, quote, "definitive" answers
4 can come from any study, but this sets the bar too high.
5 No one study can provide definitive answers and all
6 studies must be considered in light of the other
7 scientific evidence.

8 Do you agree with that?

9 A Absolutely.

10 Q Okay. So we've talked a lot in a last day and a
11 bit about the various studies you've done for Camp
12 Lejeune, the mortality studies, the Cancer Incidence
13 Study. Do you agree that regardless of the various
14 confidence intervals, statistical analyses, comparisons to
15 Camp Lejeune.

16 A Uh-huh.

17 Q Whatever is in all -- you know, the various
18 tables and the really brilliant work you did, that those
19 are just one snapshot in a bucket of a lot of studies and
20 data about the chemicals of concern here, TCE, PCE, vinyl
21 chloride and benzene?

22 A Yes.

23 Q And when you do as an epidemiologist a weight of
24 the -- well, first of all, let me step back. If you were
25 doing a causality assessment, would you use a weight of

1 the evidence approach in determining whether an exposure
2 to a particular chemical caused a particular health
3 outcome?

4 A Well, weight of the evidence approach could be
5 interpreted in different ways. But, yes, we assemble all
6 the relevant -- what we can assemble all the relevant
7 information and try to make it like an assessment that
8 way. That's how the assessment of the evidence was done.

9 Q Uh-huh.

10 A And, you know -- and so, yes. You have to --
11 even in an individual study, the discussion sections of
12 any study will bring in any research from other sources
13 that were relevant to the particular finding you're making
14 a case for.

15 Q Yes.

16 A If that make senses. Anyway, you need to -- no
17 one study is going to be so definitive and in science in
18 general, let alone epidemiology that doesn't require
19 background information and supporting evidence.

20 Q So because one of your -- because of the
21 mortality study or the Cancer Incidence Study of 2024 for
22 a particular chemical and a particular disease doesn't
23 align with your findings in your health assessment of
24 2017, doesn't mean that your assessment in 2017 isn't
25 still valid and appropriate given the findings then; is

1 that correct?

2 A Yes.

3 Q Okay. And would you, sitting here today --
4 obviously you're the author of the mortality study.

5 A Uh-huh.

6 Q And the Cancer Incidence Study, would you change
7 any of your findings from the 2017 health assessment for
8 Non-Hodgkin lymphoma, Leukemia, bladder cancer, kidney
9 cancer or Parkinson's disease?

10 A No.

11 Q Just those five?

12 A No.

13 Q Okay. You would stand by your findings --

14 A Yes.

15 Q -- in 2017?

16 A Yes.

17 Q Are you aware of the fact that EPA has proposed
18 a total band on TCE?

19 A Yes.

20 Q Okay. And do you know what the basis of that
21 band is? A long document, I know.

22 A No, I haven't read the document.

23 Q Okay.

24 A So my guess would be -- but that would be a
25 guess -- kidney cancer, Non-Hodgkin lymphoma. The EPA did

1 a meta-analysis many years ago now indicating that --
2 supporting that, but I don't know the specifics of that
3 now.

4 Q Okay. And then can we have the other -- the
5 other NRC? So when you were -- when the NRC report came
6 out in 2009, was Dr. Christopher Portier the acting
7 director of the -- or maybe he was the actual director --
8 of ATSDR?

9 A I'm trying to remember when he replaced
10 Dr. Howard Frumkin, given that -- looking at that previous
11 e-mail, it looks like Dr. Frumkin was still there when at
12 least the prepublication of the NRC report happened.

13 Q Right.

14 A So I'm not -- I can't remember when he left and
15 when Dr. Portier started.

16 (Exhibit Number 31 was marked for Identification.).

17 Q (By Ms. Greenwald) Okay. Let me show you
18 Exhibit Number 31 and ask you if you've scene this
19 document before. This was a letter to the deputy
20 assistance secretary of the Navy and the deputy
21 commandant installation of logistics dated
22 October 22nd, 2010. And if you go to the last page,
23 it's signed by Dr. Portier as director of ATSDR. Do
24 you see that?

25 A Yes.

1 Q Have you seen this before?

2 A Yes.

3 Q So did you help write this?

4 A Did I write this? We had drafted, both Morris
5 Maslia and myself had drafted a long response to the NRC
6 report. And so we used that in our discussions with
7 Dr. Portier. He was aware of that, but he would have
8 written this; may have asked us to review it, I can't
9 remember. But a lot of what we had -- the cases we were
10 making are reflected in this.

11 Q Okay.

12 A I don't think Dr. Portier would allow anyone to
13 write something that he didn't -- signed.

14 Q Okay. So if you can turn to the second page.

15 A Uh-huh.

16 Q It's a very short paragraph. It says "thus"?

17 A Uh-huh.

18 Q Let me be perfectly clear, there was undoubtedly
19 hazard associated with drinking the contaminated water at
20 Camp Lejeune. The epidemiological studies and the
21 associated exposure modeling will hopefully help us decide
22 on the level of risk associated with this hazard.

23 Do agree with that statement?

24 A Yes.

25 Q And do you remember this enough to know whether

1 you agreed with the totality of the letter? I just don't
2 want to take a lot of time.

3 A Oh, yeah, I agree with the totality of the
4 letter.

5 Q Okay.

6 A Yeah.

7 Q All right. If you can go to Exhibit Four. It's
8 the 2014 mortality study for --

9 A Workers or Marines?

10 Q Is it three?

11 A Three.

12 Q I thought it was four. Okay; never mind.

13 A Four is the workers.

14 Q Sorry. So I mean, I'm just going to go to one
15 example. There were many, and I think we might have
16 already addressed this with my general question, but you
17 were shown several tables in various studies. If you can
18 go to page 11 of 13.

19 A Uh-huh.

20 MR. BAIN: Eleven of 13?

21 MS. GREENWALD: Page 11 of 13.

22 THE WITNESS: So we have 14 here, so you must
23 mean ten of --

24 MS. GREENWALD: Then I've got the wrong one.

25 It is civilian.

1 Q (By Ms. Greenwald) I'm sorry, I'm so
2 sorry. It's civilian.

3 A Okay. Then you were right the first time.

4 Q I'm so -- yeah; a lot of cooks.

5 A Right. Okay; civilians.

6 Q Okay. I apologize about that. The government
7 pointed you to 11 of 13.

8 A Okay.

9 Q And actually had you look at a particular
10 paragraph. It's the one on the right and it's the one
11 that starts, another serious limitation of this study.

12 A Uh-huh.

13 Q Was exposure misclassification bias; there were
14 several sources of exposure misclassification. For
15 example, due to a lack of information on workplace
16 locations; we assumed that all the Camp Lejeune workers
17 were located or spent considerable time during the workday
18 at the mainside area of the base served by Hadnot Point
19 treatment plant. Although this assumption was true for
20 most workers, undoubtedly some did not work in the
21 mainside area.

22 Do you see that?

23 A Yes.

24 Q Okay. Wouldn't that limitation that you
25 recognized here bias the results to the null, if in

1 truth --

2 A If you're comparing --

3 Q -- they were not correct.

4 A -- Camp Lejeune versus Camp Pendleton.

5 Q Uh-huh.

6 A And you're saying some of the people in the
7 exposed category are exposed and are not --

8 Q Correct.

9 A Yes. Yes.

10 Q All right. All right. I just want to -- I want
11 to make sure I understand a couple of the issues about the
12 2024 cohort study.

13 A Okay.

14 Q Am I correct in understanding that the Camp
15 Lejeune cohort study, only those assigned to units
16 believed to be located and Hadnot Point were included in
17 the study?

18 A No.

19 Q So if a Marine lived at Tarawa Terrace.

20 A Uh-huh.

21 Q But was assigned to a unit elsewhere on the base
22 and not Hadnot Point, would they have been excluded from
23 the exposed cohort in the 2024 Camp Lejeune study?

24 A Anyone who had a unit code at Camp Lejeune would
25 be included in the Camp Lejeune cohort, any unit code for

1 Camp Lejeune during the period '75 to '85; okay? Are you
2 referring to some text that we can look at?

3 Q Yeah. So you referred to mainside. Let me just
4 try to find -- I have to find -- give me one second. I
5 guess I'm trying to understand -- so can I ask you this
6 maybe: How would you define "mainside" when you use that
7 term?

8 A Mainside is Hadnot Point service area.

9 Q Okay. And Hadnot Point service area would
10 entail what?

11 A Where most of the barrack probably were located
12 and -- not probably, but were located; and where Hospital
13 Point, the old hospital was located in mainside. There
14 was one other housing area, I think, on mainside.

15 Q Did you consider Camp Geiger as part of main --

16 A No; no.

17 Q You did not?

18 A No, except for the 8th Marines, because the 8th
19 Marines were at camp Lejeune -- probably at mainside until
20 we don't know, '77, according to the Cap members; 1980,
21 according to the command chronology.

22 Q Okay.

23 A The Marine Corps -- I mean, I've met with a
24 high-ranking official at Camp Lejeune and asked that
25 person pointblank when did they leave, and he couldn't

1 tell me. But he was in the service and he was there at
2 the time. So I never got a sure answer on when the 8th
3 Marines moved to Geiger.

4 Q I see.

5 A So I concluded them in. And again, what that
6 would mean, that would mean more exposure,
7 misclassification, bias towards the null for a comparison
8 between Camp Lejeune and Camp Pendleton and for the
9 duration and those analyses; again, probably a curve that
10 goes up and then a little bit down, non monotonic.

11 Q Okay. Would you consider the Courthouse Bay as
12 Camp Lejeune?

13 A Yes. What we didn't consider was New River --

14 Q I'm sorry, we're just trying --

15 A We kept New River separate. And as I said, the
16 only Geiger unit was the 8th Marines. This is what we
17 specified to the DMVC back when we were initially starting
18 all of these studies --

19 Q Uh-huh.

20 A -- was we wanted all the unit codes for Camp
21 Lejeune and separately for New River.

22 Q I'm trying to find the page. I'm sorry. Okay.
23 Maybe we'll go back to that if I can figure out the page.

24 A What mainside makes the difference is in
25 probably in the earlier mortality studies where I'm using

1 residential exposure because then it's important where
2 they are on base. Are they at mainside or are they at
3 Tarawa Terrace? Are they at Holcomb Boulevard or are they
4 at Courthouse Bay, Rifle Range or whatever.

5 Q Uh-huh.

6 A That would have an impact on the exposure
7 assessment in the earlier mortality studies but not in the
8 new studies.

9 Q Okay. All right. Okay. If you look at tables
10 two and three -- I'm going -- now I'm going to go to the
11 Camp Lejeune exposed group table; the Cancer Incidence
12 Study tables two and three.

13 A Okay.

14 Q I think you went over this with Mr. Bain before
15 when we took a break.

16 A The Standardized Incidence Rates.

17 Q Correct, the Standardized Incidence Rates for --
18 and then tables four through seven.

19 A Okay.

20 Q So, and then -- so two and three --

21 A Uh-huh.

22 Q -- is for Marines and Navy personnel. And then
23 four through seven --

24 A No, table two is for Marines. Table three --

25 Q Right.

1 A The SIR civilian workers.

2 Q Right.

3 A Table four is the Marine, the straight
4 comparison --

5 Q The comparison for marines; right?

6 A Using Cox model --

7 Q Yep.

8 A -- for personal hazards, yeah.

9 Q All right. For the results that you show in
10 these tables, did you assume a non-differential exposure
11 misclassification?

12 A Well, the actual figures here are what you get,
13 but there is exposure misclassification most likely, so we
14 did the de. That's why we did the Quantitative Bias
15 Analysis to see if you assume up to 25 percent of the
16 Marines at Camp Lejeune were not exposed.

17 Q Uh-huh.

18 A Then we could have gone to 30 percent, but we
19 had a range in the Quantitative Bias Analysis this is what
20 would have happened to several of the outcomes we've
21 showed. And differences depended on the outcome and how
22 rare it was.

23 If it was an outcome that wasn't rare,
24 differences weren't great. It had an impact. I'm not
25 saying it didn't have an impact. And if it's close to

1 1.2, it might have -- a finding of, say, 1.18, 1.18 might
2 have pushed it over to 1.2, and I would have highlighted.

3 Okay. So it had some impact, but mostly
4 the confounding due to smoking, confounding due to alcohol
5 consumption and exposure misclassification bias in
6 general, all three of them did not have a major impact.
7 And that's because of the similarity between Camp Lejeune
8 and Camp Pendleton. They were very similar in a lot of
9 different factors, risk factors. Okay. So that's why --
10 yeah, so.

11 Q Okay. Going back to the deployment issue we
12 talked about a little while ago.

13 A Uh-huh.

14 Q If Marines at Camp Lejeune were deployed off
15 base or participated in training at other locations where
16 there was no contamination at Camp Lejeune --

17 A Yes.

18 Q During a time that their unit was assigned to
19 Camp Lejeune, they would have been classified in the
20 exposed Camp Lejeune group; right?

21 A Yes.

22 Q Okay. Even though they weren't actually at Camp
23 Lejeune?

24 A Right; I wouldn't have known.

25 Q Okay.

1 A Yeah.

2 Q And in contrast, Marines and civilians at Camp
3 Pendleton were not exposed at all. So whether they were
4 on base or not, almost doesn't matter.

5 A Yes.

6 Q Okay; assuming you're not at Camp Lejeune.

7 A I mean, you know, I'm sure someone at Camp
8 Pendleton may have lived somewhere where there might have
9 been some contamination outside somewhere in California,
10 you know, if they lived off base. But, yes, the
11 assumption is that Camp Pendleton is free of
12 contamination.

13 If that's not true, if some of Camp
14 Pendleton people lived off base in a place where there was
15 contaminated drinking water somewhere, what would that do?

16 That would make it harder to see anything.
17 Again, you would be calling people unexposed when they
18 were exposed. And that's your reference group, but again
19 bias towards the null. So anytime you mix things up, you
20 put exposed people in the unexposed category when they
21 shouldn't be there or vice verse, you're going to -- and
22 when you do a straight comparison between exposed and
23 unexposed, you bias most likely towards the null; okay?

24 So if some people at Camp Pendleton were
25 actually exposed, it makes it harder to see something. If

1 people at Camp Lejeune were not exposed, assuming they
2 are, again it would make it harder to see something.

3 Q Okay.

4 A Okay? Is that clear to everyone? Okay.

5 Q I think I'm beating that horse to the ground. I
6 hate that expression, but I'm going to move on. So you
7 state in your report, this Cancer Incidence Study on lines
8 656 to 663.

9 A Sixty-three.

10 Q You mention between ten and 25 percent of those
11 assigned to Camp Lejeune were likely unexposed to the
12 contaminant in the water. Can you explain how you arrived
13 at those ten to 25 percent?

14 A So can you give me those again? I'm sorry.

15 Q Sure on lines 656?

16 A Six-fifty-six.

17 Q To 659, and it's on Bates Number 123. I think
18 you and I have the same versions.

19 A Yeah.

20 Q So it's 123.

21 A No, it's just, again, for the purposes of
22 Quantitative Bias Analysis, I was making some assumptions.

23 Q Uh-huh.

24 A Suppose it was 25 percent. Suppose it was
25 ten percent.

1 Q Okay.

2 A Again, it could have been higher. And from the
3 graph, you could probably figure what it would be if there
4 were 30 percent unexposed by just plain extrapolation.

5 Q Okay.

6 A But there is no -- I mean, no. No one knows.

7 Q So the AML that you reference here, it increased
8 when you factored in the ten to 25 percent; it increased
9 the hazard ratio to 1.42 for the ten percent and 1.50 for
10 the 25 percent; right?

11 A Yeah, right.

12 Q And I'm really bad about percentages, but is
13 that about a ten percent increase?

14 A Ten percent would be 1.52 if I got it right.

15 Q So close to ten percent.

16 A Close to ten percent.

17 Q To 25 percent?

18 A Yeah.

19 Q Okay.

20 A If you assume 25 percent unexposed, yeah.

21 Q Okay. So if you look at -- so if you -- I'm
22 going to mark -- this is my last exhibit; mark as Exhibit
23 32, the supplemental files that are referenced here.
24 (Exhibit Number 32 was marked for Identification.).
25

1 Q (By Ms. Greenwald) In your report S2-2A?

2 A S2-2A.

3 Q I'm trying to find it, too.

4 A In the published study things have changed
5 number-wise.

6 Q Oh, right.

7 A The tables haven't changed.

8 Q Trying to find it, too.

9 MR. BAIN: What's the number again?

10 MS. GREENWALD: It's S2.

11 THE WITNESS: Oh, it's all the way in the
12 back.

13 MS. GREENWALD: Yeah, it's towards the back.

14 THE WITNESS: I'm sorry, that was the
15 exposure misclassification.

16 MS. GREENWALD: S2-2A.

17 THE WITNESS: Yeah, yeah. Right.

18 Q (By Ms. Greenwald) Had to copy all of
19 these pages just to get this. This doesn't have it.

20 A It's at the end of the supplemental.

21 Q Well, my version doesn't have that. Here it is.
22 We already did AML which is in your paper. If you look at
23 kidney cancer, that's on the last page?

24 A Yeah, so that's workers. Right; yes.

25 Q Well, kidney is not referenced for Marines;

1 right?

2 A Right.

3 Q Okay. So for kidney it goes from 1.12 to 1.14
4 at the ten percent; and then 25 percent, 1.16?

5 A Right.

6 Q Adjusted, okay.

7 A Uh-huh.

8 Q And for Non-Hodgkin lymphoma, at the 25 percent
9 it goes to 1.24?

10 A Yes.

11 Q What kind of percentage increase was that?
12 That's all right. I don't want to hold you.

13 A About five percent.

14 Q Okay.

15 A Counting from the top of my head.

16 Q All right. So going to the Cancer Incidence
17 Study table six and seven again.

18 A Uh-huh.

19 Q Table six, actually.

20 A Duration.

21 Q Table six, okay. I think you went over this a
22 little built with Mr. Bain, that there was only a
23 monotonic trend for thyroid cancer in the Marines; is that
24 right?

25 A That's my recollection.

1 Q Okay.

2 A I would look at the text to see if that's -- but
3 definitely thyroid was, yes.

4 Q All right. Okay. If the Marines classified in
5 the medium or the high duration range were more likely
6 than the low duration group to be deployed or off base for
7 extended periods, could this explain the lack of monotonic
8 trends in the exposure for some of the cancers?

9 A It could.

10 Q Okay. On lines 969 to 979, which is Bates 133?

11 A Uh-huh; yes.

12 Q The first sentence reads, an additional factor
13 affecting both the magnitude of the HR's and 95 percent
14 CIR in the subgroup analyses of the Marines/Navy personnel
15 was that at the end of follow-up the median age was 57
16 years and over 75 percent of the subgroup members were
17 under the age of 60 years old.

18 A Yes.

19 Q Did you see that? I read that correctly?

20 A Yes; yes.

21 Q Okay. Do you know what SEER data is?

22 A It's the National Cancer Incidences
23 Surveillance, E-E-R.

24 Q It's okay. I just -- you're familiar with what
25 that is?

1 A Oh, yeah; yeah. Yes. Sorry. I always forget.
2 I just say SEER all the time and then I don't remember.
3 I'm sorry.

4 Q Would it sound right to you if I were to tell
5 you that the SEER data says the medium age of getting
6 bladder cancer is 70 years old. Does that sound about
7 right?

8 A That sounds about right.

9 Q Okay. Considering that bladder cancer generally
10 develops later in life, would you agree that the study may
11 be underestimating the association between exposure and
12 bladder cancer in this population?

13 A It could, yes.

14 Q Okay. Same question for kidney cancer. If I
15 told you that the SEER data has the median age for kidney
16 cancer at around 64 or 65 years old, does that sound
17 right?

18 A Yes.

19 Q Okay. Given the younger cohort in this study,
20 would you agree that the data might not fully capture
21 again the potential association between exposure and
22 kidney cancer?

23 A Yes.

24 Q Okay. And AML, If I told you that the SEER data
25 has the median average for diagnosis of AML at

1 approximately 68 years old, does that sound right?

2 A Yes.

3 Q Again, same question: Would you agree that the
4 younger age population likely means that the study is
5 missing potential associations between exposure at Camp
6 Lejeune and the development of NHL?

7 A Right.

8 Q I'm sorry, AML. Forgive me.

9 A AML, yes.

10 Q Okay. Now I'm going to ask about NHL. Does it
11 sound right that the SEER data would have the medium age
12 at around 67 years old for NHL?

13 A Yes.

14 Q All right. Again, the same question: Would the
15 younger cohort here also suggest that some -- that it
16 could be missing some of the Non-Hodgkin lymphoma in the
17 Camp LeJeune pool?

18 A Right.

19 Q Okay. So in your professional opinion would we
20 expect stronger associations if the study had continued
21 longer or included an older population and follow-up?

22 A We're certainly --

23 MR. BAIN: I just want to oppose an
24 objection; an incomplete hypothetical and I'll
25 just say form. I'm sorry.

1 THE WITNESS: Well, I mean, we wouldn't know
2 because we're not capturing cancers that would
3 occur as these people age both at Lejeune or
4 Pendleton for that matter. So it's a strong
5 argument for repeating this study at a later date
6 when these people are of the age when most cancers
7 occur.

8 But -- and I'll leave it at that because I
9 can't say for sure that it would increase or
10 decrease the association. If, in fact, these
11 associations are not real for some reason, some
12 bias that we don't know about, which is always
13 possible in this study, any study, you know, what
14 would happen in the future is hard to say.

15 Q (By Ms. Greenwald) Right.

16 A But because we don't have information on cancers
17 that will occur later to these populations, what that
18 means is if we had more data, of course, we would have
19 narrower confidence intervals. That's for sure. Whether
20 the association would go either way, it's hard to say.

21 Q I wasn't suggesting an association as much as
22 that you would have data that reflects the expected age of
23 that type of cancer and you would have a larger pool of
24 information involving those five cancers --

25 A Yeah, it's similar to the mortality study

1 extension. As people age, you get more cases. You're
2 capturing more of the events. You feel better about the
3 analysis, so, you know, that's true. That's why
4 occupational studies often are -- you see an extended
5 analysis and so on. As time goes on --

6 Q Uh-huh.

7 A -- they follow them further because they want to
8 capture as many cases as they can from the population. So
9 this population definitely will have more cancers. And we
10 don't -- they're not including this study because it
11 happened after --

12 Q Right.

13 A -- 2017.

14 Q Okay. All right. Now I'm going to go in the
15 other direction of where this started. The exposure
16 period at Camp Lejeune ended in December 1985; is that
17 right?

18 A Sometime for the cans for study --

19 Q For the cancer incidence study?

20 A For in general, the exposure stopped sometime in
21 1985. The question I've always had with the Marine Corps,
22 what to do with the benzene readings later in the year.
23 And they claimed that they're bogus somehow, but they were
24 lab verified. So I -- you know, so I -- actually, I've
25 looked at the data different ways. One way would be to

1 assume that the contamination stopped in March.

2 Q Of '85?

3 A Eighty-five.

4 Q Right.

5 A Because by the time you shut down the wells, it
6 probably takes a few weeks for it to clear out the system.
7 So from March on I looked at -- suppose that's the case,
8 and I looked at the -- and I did an analysis and suppose
9 that's not the case and benzene readings are real.

10 And looking at it either way made
11 absolutely no difference, maybe a tenth of a point
12 difference, 1.26 instead of 1.27, but didn't change
13 anything. So, but I don't know what you conclude from
14 that other than maybe that those benzene readings are
15 real. But we'll never know.

16 Q So I'm going to move ahead to something I was
17 going to ask later?

18 A Uh-huh.

19 Q But I'm going to jump to it now and then I'll go
20 back to what I was just going over. If, in fact, the
21 concentrations of TCE, PCE and vinyl chloride, and DCE
22 were zero starting in February of 1985, assuming they were
23 zero in February.

24 A Uh-huh.

25 Q That would mean 11 months were included of times

1 that -- of a period where people in Camp Lejeune would not
2 have actually been exposed those chemicals; right?

3 A Right. If that was the case, yes.

4 Q Okay. If that were the case.

5 A Yeah.

6 Q And that would again bias the results to the
7 null.

8 A Right.

9 Q Okay. And again, putting benzene aside, I'm
10 talking about those four diseases. So if it was a disease
11 associated with a particular chemical like PCE and bladder
12 cancer, that would not reflect the fact that there was an
13 11-month period --

14 A Uh-huh.

15 Q -- in which that person was not exposed to PCE.

16 A Right.

17 Q Okay.

18 A Anytime you misclassify like that --

19 Q Okay.

20 A -- it would have an effect. The question is how
21 big. Yep.

22 Q Okay. So going back to what I was asking you
23 about the shorter period.

24 A Uh-huh.

25 Q So the follow-up period for the study began in

1 '96; correct?

2 A Yes.

3 Q Okay. So there's approximately ten to 11-years
4 gap between the end of the exposure period and the start
5 of the follow-up; is that right?

6 A That's right; yes.

7 Q Okay. Given that the study period follow-up
8 starts in '96, is it correct that any cancers that
9 developed between '85 and '96 would be missed in this
10 analysis?

11 A Yes.

12 Q Okay. So for cancers with a shorter latency
13 period --

14 A Uh-huh.

15 Q -- those potentially have ten years or less?

16 A Uh-huh.

17 Q That would be missing from the data; right?

18 A Yes. If they had a cancer before '96, that
19 cancer is not included, no.

20 Q And would you agree that certain blood cancers
21 can have a latency of under ten years?

22 A Yes.

23 Q Is an example?

24 A No; that would be the primary example, yes.

25 Q Okay. I think I might be finish. Just give me

1 one second. Can we just go off the record for two
2 minutes?

3 THE VIDEOGRAPHER: The time is 1:01 p.m.,
4 going off the video record.
5 (off the record.).

6 THE VIDEOGRAPHER: We are back on the record.
7 The time is 1:21 p.m.

8 Q (By Ms. Greenwald) Dr. Bove, I just have a
9 couple of questions. I'm going to try to go back to
10 the water systems and see if I can do it clearer
11 this time.

12 A Okay.

13 Q Did you know that there were eight water systems
14 at Camp Lejeune?

15 A Yes.

16 Q Okay. Did the DMDC data distinguish between the
17 locations that were served by each of these water systems?

18 A DMDC data doesn't have that information, no.

19 Q Do you know that they just list them all as Camp
20 Lejeune except for New River?

21 A That's how the -- we had asked and the Marine
22 Corps and the DMDC did historical research to try to
23 determine which units were Camp Lejeune, which units were
24 new river, which units were Camp Pendleton. So one of the
25 limitations might be that there could have been errors in

1 that historical research because the Marine Corps
2 certainly didn't know right offhand which units were in
3 each base. They had to do a historical research and so
4 did the DMDC. So working together, my understanding, we
5 asked for Camp Lejeune, we asked for New River and we
6 asked for Pendleton.

7 Q And so the only thing that you excluded was New
8 River?

9 A Right. Right.

10 Q Okay. Okay. Thank you. I just was confused
11 and that was really helpful.

12 A Okay; sorry.

13 Q I appreciate it. No, no, no, no, no. It was my
14 question. It wasn't you.

15 So I just want to thank you so much for
16 your time and all the work you've done on behalf of the
17 people at Camp Lejeune and all the incredible science
18 you've done in support of the Military and civilian
19 workers at Camp Lejeune and all your time here. So thank
20 you so much.

21 THE WITNESS: Sure. Thank you.

22 RECROSS-EXAMINATION

23 BY MR. BAIN:

24 Q Dr. Bove, I have just a few measure questions.
25 It's going to be less than 11 minutes.

1 A Okay.

2 Q Probably much less.

3 A Okay.

4 Q So those questions that you just got, I just to
5 make it clear, the 8th Marine unit was included; right?

6 A Yes.

7 Q And, but at some point it moved to Camp Geiger.

8 A Right.

9 Q But it was still included after --

10 A Yes.

11 Q The Quantitative Bias Analysis, is that only
12 apparent or shown as far as the statistics in the
13 supplemental material or is that incorporated into any of
14 the tables in the report itself?

15 A It's incorporated in the text only.

16 Q Okay.

17 A And then the tables are in the supplemental.

18 Q Okay. So it's not reflected in any of the
19 tables in the report?

20 A No; no. We're assuming no bias and that, you
21 know -- and then we do a Quantitative Bias Analysis to see
22 what would happen if there was bias and which direction
23 would it go.

24 Q And that's in the Cancer Incidence Study;
25 correct?

1 A Both studies, mortality study also did a
2 Quantitative Bias Analysis.

3 Q Okay. And that analysis would just be reflected
4 in the supplemental materials for each study?

5 A The tables would be. But again, in the text, it
6 would describe what the results looked like.

7 Q Okay. There was some discussion about people
8 being deployed; and if they were deployed and still shown
9 to be at Camp Lejeune for the entire time, that would tend
10 to bias to the null. Do you recall that?

11 A If we're comparing exposed to unexposed, camp
12 Lejeune to Pendleton, yes.

13 Q Okay.

14 A Again, with exposure misclassification, if there
15 truly is no risk, it won't.

16 Q Uh-huh.

17 A So part of the definition of this is -- or the
18 explanation of this is, if there is a true exposure
19 effect, it would underestimate it most likely if -- in
20 comparisons that are dichotomous; okay? Exposed,
21 unexposed.

22 Q Did you do any investigation as to what type of
23 deployments, Marines were going on during the period of
24 your cohort?

25 A No, it's word of mouth that people were

1 deployed. The survey -- actually, I should say the
2 survey, there were some people who said they were at a
3 base not far from camp Lejeune but in other parts of North
4 Carolina, and so that told us that here's an example of
5 someone who wasn't there but their unit was there.

6 Q Uh-huh.

7 A So, but, no, we did not do an analysis of that.

8 Q Was --

9 A I'm not sure how we would unless we went to the
10 muster rolls to do that.

11 Q Was there any potential that a deployment could
12 result in a toxic chemical exposure?

13 A No idea.

14 Q You don't know one way or the other?

15 A Yeah, right. We don't know where they went.

16 Q For example, if there were -- and I'm not sure,
17 you know, what periods might have been implicated here,
18 deployments to Vietnam could have involved toxic exposure;
19 right?

20 A This was -- yes, not for the subgroup because
21 they started active duty after Vietnam.

22 Q Okay.

23 A Okay; '75.

24 Q And what was the date of that? '75?

25 A Yeah, April '75. So after '71, pretty much --

1 but there were people in the full cohort that could have
2 started active duty during the Vietnam war era. And I
3 think there was a variable for Vietnam War. The problem
4 in the DNDC data, but the problem, there is missing data
5 and it's hard to use for that reason. So I'm sure in the
6 full cohort there were some probably that were in Vietnam,
7 in both groups, both Pendleton and Lejeune.

8 Q They could have been deployed to Vietnam before
9 they were at Camp Lejeune and they would still be in the
10 cohort then?

11 A They would be in the cohort if they were in Camp
12 Lejeune between '75 and '85, yes; or if they were at
13 Pendleton between '75 and '85.

14 Q And going back, you were shown, you know, some
15 documents regarding the NRC report and criticisms of that
16 report. Do you recall that?

17 A Yes.

18 Q And your assessment of the evidence, you
19 consider that to be a weight of the evidence analysis;
20 right?

21 A You can call it that.

22 Q Okay.

23 A I mean, as I said, there are some -- some people
24 have a district definition of what weight of evidence
25 approach is. But we're weighing the evidence, so you can

1 say it's a weight-of-evidence approach.

2 Q And when you do a weight-of-the-evidence
3 approach, you discuss the limitations of studies, as well
4 as the good features of studies; right?

5 A Yes. Yes.

6 Q And is there any reason why you didn't include
7 the NRC report and discuss the limitations of that report
8 in your 2017 assessment?

9 A I didn't feel that that report was in any way
10 useful for that assessment.

11 Q Okay.

12 MS. GREENWALD: Okay. I have no further
13 questions. I would also like on the record to
14 thank you for your many years of service at the
15 ATSDR and all the work that you've done for Camp
16 Lejeune.

17 THE WITNESS: Thank you. We're done?

18 THE VIDEOGRAPHER: The time is 1:28 p.m. We
19 are off the record.

20 (Deposition concluded at 1:28 p.m.).

21 *

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STATE OF GEORGIA

COUNTY OF FULTON

C E R T I F I C A T E

The foregoing transcript of the proceedings was taken before me as Court Reporter for Fulton County and reduced to typewriting under my direction and supervision, and that the foregoing pages 1 through 140 represent a true and correct transcript of the proceedings.

This 22nd day of October, 2024.



JOLANDA L. HARRISON, RPR, GRL,
SUPERIOR COURT OF FULTON COUNTY
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Federal Rules of Civil Procedure

Rule 30

(e) Review By the Witness; Changes.

(1) Review; Statement of Changes. On request by the deponent or a party before the deposition is completed, the deponent must be allowed 30 days after being notified by the officer that the transcript or recording is available in which:

(A) to review the transcript or recording; and

(B) if there are changes in form or substance, to sign a statement listing the changes and the reasons for making them.

(2) Changes Indicated in the Officer's Certificate. The officer must note in the certificate prescribed by Rule 30(f)(1) whether a review was requested and, if so, must attach any changes the deponent makes during the 30-day period.

DISCLAIMER: THE FOREGOING FEDERAL PROCEDURE RULES ARE PROVIDED FOR INFORMATIONAL PURPOSES ONLY.

THE ABOVE RULES ARE CURRENT AS OF APRIL 1, 2019. PLEASE REFER TO THE APPLICABLE FEDERAL RULES OF CIVIL PROCEDURE FOR UP-TO-DATE INFORMATION.

VERITEXT LEGAL SOLUTIONS

COMPANY CERTIFICATE AND DISCLOSURE STATEMENT

Veritext Legal Solutions represents that the foregoing transcript is a true, correct and complete transcript of the colloquies, questions and answers as submitted by the court reporter. Veritext Legal Solutions further represents that the attached exhibits, if any, are true, correct and complete documents as submitted by the court reporter and/or attorneys in relation to this deposition and that the documents were processed in accordance with our litigation support and production standards.

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